MARINE REVIEW.

VOL. XI. CLEVELAND, O., MAY 23, 1895. No. 21.

Some Facts about the Fast Steamer Unique.

Although the steamer Unique is temporarily retired from service, owing to the accident to one of her boilers which unfortunately occurred just when the boat was beginning to do good business, she was in commission long enough to prove beyond a doubt that Mr. McElroy has produced the fastest business craft yet afloat on fresh water. She has made the run from Port Huron to Woodward avenue, Detroit, in 3 hours 52 minutes, making seven stops. The actual running time was 3 hours 22 minutes. The time across Lake St. Clair, eighteen miles, was 1 hour 6 minutes, which deducted from the whole running time, gives 2 hours 16 minutes for the balance of the distance, forty-five miles, or at the rate of 19.84 miles per hour, without making allowance for slowing down in the canal. Some stretches were covered in much faster time. The distance from Port Huron to St. Clair, twelve miles, was done in 31 minutes, or at the rate of 23.21 miles per hour, or, allowing for a two-mile current, 21.21 miles per hour; and the distance from Windmill point to Woodward avenue, seven miles, in 19 minutes 50 seconds, which is also better than 21 miles per hour. Some shorter stretches have been done at even better rates.

The maximum cut-off in high-pressure cylinder so far has been 66 per cent., whereas it can be extended to 77 per cent. The claim made by a Detroit paper that the Cole had made better time over the route than the Unique falls to the ground in the face of the fact that the Frank E. Kirby has for some time claimed and been allowed the record at 4 hours and 17 minutes, making the same stops.

The time across Lake St. Clair is remarkable for a screw boat, considering the present low stage of water. The yacht Sigma has hitherto held the record for this stretch in almost exactly the same time, (1 hour, 6 minutes, 7 seconds) while the water was 3 feet higher than now.

Some difficulty has been experienced in getting firemen to remain in the stokehold of the Unique and maintain a steady steam pressure, owing to the excessive heat, so that it has not yet been found practicable to work at later cut-offs than 66 per cent. Before the boat goes into commission again this will be remedied. The boilers have demonstrated their steam-making abilities, their being no trouble in raising steam and keeping it as long as the men could stay and attend to the fires, and the water level was remarkably steady, fully as much so as with the ordinary shell boiler.

A peculiar feature of the boat's performance is to be noted in the fact that while remarkably free from vibration at all times its absence is even more noticeable at the higher speeds, and at 200 revolutions and upwards at any point on the boat she seems almost lifeless. Mr. McElroy is entitled to and will receive all credit for his enterprise and persistence in the face of the difficulties that have beset him, and while the late accident is deplorable in its results it is certain that all defects will be remedied and that the Unique will yet do a prosperous business.

Lake Freight Matters.

The fact that iron ore freights have actually scored a small advance with practically no movement of soft coal from Ohio ports, and only a light movement of hard coal from Buffalo, is cause for some encouragement among vessel owners. Although fully 85 per cent. of the lake fleet of coarse freight carriers have been running up the lakes light, the demand for vessels in the ore trade has exceeded the supply since the opening of navigation, and it was only by a determined effort that shippers during the past week succeeded in preventing the wild rate from advancing to 80 cents. Owners were allowed in some instances to crowd their 80-cent contracts, carrying more ore this month than was due them under agreements covering a stated amount of ore to be moved each month. A few shippers express a willingness to make additional contracts on the 80-cent basis, and one block of 100,000 tons was taken a few days ago by Capt. James Davidson at that figure to run to about Nov. 1. Rates are strong at 75 cents from the head of the lakes, 65 cents from Marquette and 45 cents from Escanaba.

Vessel owners may now be said to have scored a victory in their opposition to buying fuel from hard coal shippers at Buffalo, who demanded unreasonable profits in the fuel business in return for cargoes. Cargoes are now furnished quite freely at Buffalo, without stipulation of any kind as to where fuel is to be furnished, but rates are, of course, very low—15 cents to Lake Superior ports and 30 cents to Lake Michigan ports. Mining difficulties in the soft coal districts of Ohio and Pennsylvania are still in the way of an active movement of soft coal, but there are some indications of a settlement, and a limited amount of coal is showing up for shipment.

Lake freight rates are ridiculously low, however, only 25 cents being offered on a few single cargoes to Lake Superior and 30 cents to Lake Michigan ports. Shippers have offered 32½ cents on two or three blocks of coal to go to Lake Superior and to be carried throughout the season, but as yet no owner has been found to accept such a rate. It is understood that one contract has been made with boats controlled by J. R. Irwin of Fairport covering a quantity of coal to go to Milwaukee at 40 cents.

Ore Trimming Question.

Managers of the ore docks at Gladstone have entered into a written agreement with the Inter-Ocean Transportation Co. to trim cargoes in vessels of that company at 2½ cents a ton. This rate will apply on about 50,000 tons of ore to be moved by the Inter-Ocean company from Gladstone, and it is understood that the same rate will be made to other boats that may go to that port for cargoes. This establishes a 2½-cent rate for trimming at all ports excepting Escanaba, as the recent trouble at Marquette had reference to the number of boss trimmers and not the rate. It would seem in this connection that the boss trimmers are useless pieces of furniture, as the vessel masters must look after trimming anyhow, and the vessel interests will probably be removing a disturbing influence by getting rid of them when an opportunity presents itself in making arrangements for another season.

Boats of the Inter-Ocean, Mutual and Menominee companies, which are the principal lines trading to Escanaba, have been doing practically no trimming, and it is only a matter of a little time when the rate at that port will also be 2½ cents. Manager J. C. Ricketson of the Inter-Ocean company says he does not intend to do any more trimming at Escanaba on the wooden boats of his line, even if the rate is put down to 2½ cents. He is not decided about the steel boats, Maryland and Manchester, but says he may get along without trimming in their case, also. "In any event," he says, "I will make no promises about our boats in the future. If I trim at all, it will be from trip to trip. I take very little interest in the subject now, as I am satisfied we can get along without trimming."

A Distinguished Member of Congress.

Members of the Lake Carriers' Association in Buffalo, Cleveland, Detroit and other leading points on the lakes are about to show a little honor to a distinguished member of congress who will be their guest next week. Hon. Binger Hermann of Oregon is about to take a trip up the lakes on the steamer China of the fleet controlled by Mr. E. T. Evans of Buffalo, sailing from Buffalo May 30. Mr. Hermann is one of the oldest and most influential members of the river and harbor committee in the house, and is the probable chairman of the committee for the next congress. He has been very active in river and harbor matters and very successful in looking out for the interests of the Columbia river improvements in his own state. He will be accompanied by his family, and upon arrival in Buffalo he will be taken about the harbor by a committee made up of Secretary Keep of the Lake Carriers' Association, representatives of the Merchants' Exchange, the government engineer and several leading vessel owners. Mr. Hermann's stay of a few hours in Cleveland will also be made as pleasant as possible by executive officers of the association here. In Detroit he will be met by President Livingstone and other vessel owners, and it is probable also that arrangements will be made for his entertainment at the head of the lakes.

It was intended to have the North Land, second of the Northern line passenger ships, taken out in the lake from the works of the Globe company early in the week for a trial of her machinery, but the trip has been postponed until Saturday, when it is expected the other big boat, the North West, will be in Cleveland with a large party of railway passenger and ticket agents.

A. W. Machen, superintendent of the free delivery system, post office department, makes official announcement of the order of the postmaster general extending the free delivery service to vessels passing Detroit. The service will be known as the marine service and it will be begun as soon as details can be arranged in the Detroit postoffice.

Mr. Dickie Writes of the Olympia's Stern Tubes.

In the REVIEW of April 18, 1895, there was printed from the Scientific American a criticism of the form of construction adopted for the U. S. S. Olympia, which was built by the Union Iron Works of San Francisco. The attention of Mr. G. W. Dickie, manager of the Union Iron Works, having been called to the article as it appeared in the REVIEW, he concluded to answer it in the June number of Industry, the representative engineering magazine of the Pacific coast. Mr. Dickie has asked that the answer be published also in the REVIEW, and we are enabled to print it herewith through the kindness of the editor of the Pacific coast publication. Mr. Dickie says:

"The Olympia having passed from the hands of her builders into the United States navy, there is now no reason why those who have a prominent part in her construction should permit such articles, apparently written for the purpose of misleading those not conversant with the facts, to go unanswered. With the statement of facts and sizes given in the article, I have not much fault to find, and I will simply correct them before taking up the other points of the writer above mentioned.

"The diameter of the stern tube is given as 3 feet 9 inches at the forward end, it should be 3 feet 7¾ inches; the thickness of plating is given at ⅜ inch, it should be ½ inch. In describing the connection between the stern tube and the skin of the vessel, the author says that it 'tapers at a much more rapid rate than the tube which it supports. This is done probably to afford the water as free a run to the screw as possible, but this intention is in no small degree defeated by the fact that the bracket arms which support the stern bearing are attached to the hull at points considerably above and below the after thin end of the cellular structure referred to and have to be dragged through the water, and must by whatever resistance they oppose, impair the speed of the ship.' Now this fact here stated as defeating the design, is not a fact at all, as the cellular structure he refers to terminates on the arm of the strut, which is rabbetted to receive the plating, one of the objects of the structure running out to the thickness of the strut arm being to avoid the resistance due to dragging the strut arm through the water.

"The thickness of the bronze casing on the stern shaft is given at 1 inch, it should be ¾ inch; the weight is given at 6,000 pounds, it should be 4,110 pounds; the water surrounding the shaft in the tube is given at 10,000 pounds, it should be 9,500 pounds; the weight of bronze on the shaft and water is given at 16,000 pounds, it should be 13,610 pounds; which would be 27,220 pounds for both sides, instead of 32,000 pounds, as given by the author. I do not find fault with the figures given relating to these tubes and the bronze casing on the stern shafts, only that they should have been compared with similar parts on other cruisers or vessels. Any one not an expert, would conclude that the bronze covering on the Olympia's propeller shafts here described and the weight given, was a necessity of this faulty construction, and was not required on the stern shafts of other vessels, and that stern tubes were not necessary on the modern twin-screw vessel.

"In order to place this matter clearly before the readers of Industry, it will be necessary, before taking up the 'reflections' that were suggested to this writer by an examination of the Olympia's drawings, to give a little of the history of the particular form of stern tube fitted to the Olympia. Fig. 1 of the accompanying drawings shows the stern tubes of this vessel as originally designed at the department, and Fig. 2 the stern tubes proposed by the builders and approved by the department. The original design is similar to the arrangement as fitted to the U. S. S. San Francisco. In the original design for that vessel, the stern tubes ended at the skin of the vessel, leaving the shaft unsupported for a distance of about 41 feet, with a coupling near the stern tube. I made a strong effort to have some such plan as that in Fig. 2 fitted to the San Francisco, and a compromise was agreed upon by extending the tube further out to get a bearing nearer to the bracket bearing."

"The department had in this the precedent of practice by eminent builders in support of their plans, and a plan of the stern tubes and supports of the S. S. City of Paris was sent to show that our objections were not supported by the best practice. In a letter to the bureau of steam engineering, dated May 24, 1888, a similar arrangement to that on the Olympia was proposed. I will quote a few sentences from this letter to show the position we then held here on this question: 'According to the present plans and specifications for propeller shafts, stern tubes and supports for same, the distance between bearings, in our opinion is excessive. If we take the points of support as, say, once the diameter of the shaft, aft of the forward end of stern bracket bearing, and once the diameter of the shaft forward of the after end of the stern tube bearing, the distance between these points is 40 feet, with a coupling near one end of the span. * * * * The coupling being outside the vessel, and beyond the reach of inspection, makes this a very dangerous point on the shaft, as a failure of this coupling would be a very serious matter.' (The City of Paris disaster had not then happened.) * * * * 'We are confident that the bureau of steam engineering will agree with us in this, that the shorter that portion of the shaft that can not be examined, the better it will be, both for the machinery and the ship.'

"After describing the proposed method of supporting the shafts and moving the stuffing box about 30 feet further aft, the letter goes on to say that 'the plating used would be the same as for the outside of the vessel, and the work done in the same manner. There would be an increase of about ten tons in weight by the adoption of this plan, but there would be also an increase of about twenty-two tons in displacement. We desire to urge upon your department a careful consideration of this proposition, as we do not feel satisfied that the stern shafts as now supported will be perfectly safe in working, and the disastrous effect that might be the result of a failure has led us to give this matter a very careful study.'

"The department did not care to make the radical change we suggested, but a compromise was agreed upon, whereby the stern tubes were lengthened so as to shorten the unsupported part of the shaft out-

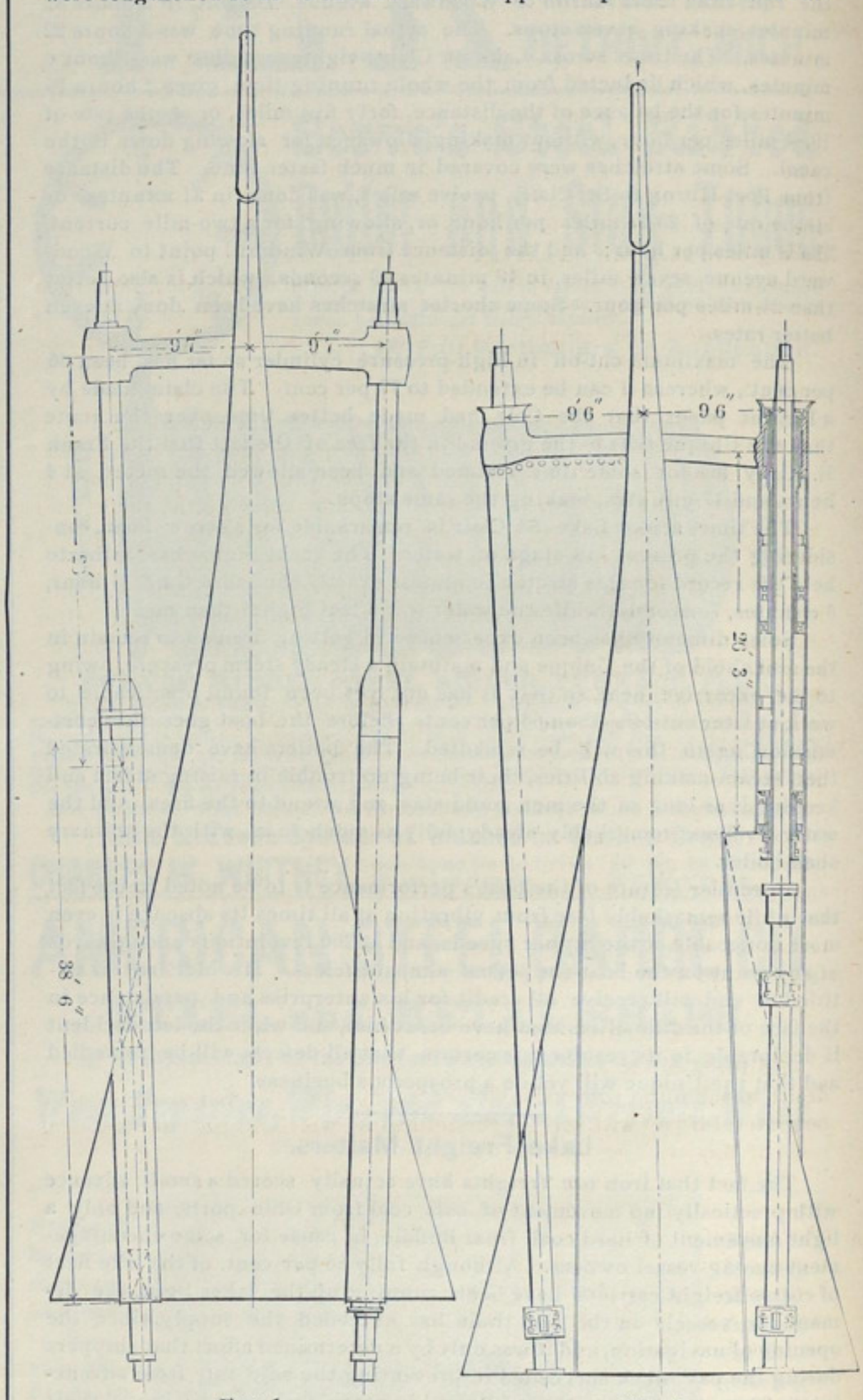


FIG. 1. FIG. 2.

side of the vessel. This modified plan was adopted in the department plans for cruiser No. 6 (Olympia). It will be seen by this plan (which is very much the same as those of the cruisers built by the Cramp company) that 70 feet of the shaft is outside the stuffing box, with a coupling in the middle of this length; while the plan we proposed and which was finally adopted, moved the stuffing box 37 feet further aft, leaving only the after length of the shaft outside. In the original plan 57 feet of the shaft was to be cased in bronze, while the modified plan reduced this to 31 feet. In fact the only difference between the stern work on the Olympia and that now fitted to the most modern type of twin-screw passenger steamers, consists in fitting a well or opening through the stern in line of the propeller blades, which permits of the shafts being brought closer together, permitting of the stern bearings being carried by a horizontal arm instead of the double-armed strut. The projection of the hull work is then built on a horizontal plane instead of being normal to the skin,

as in the Olympia, although some prominent naval architects still claim that such projections should be normal to the skin at all points.

"Now in regard to the reflections indulged in by the author of the article in the Scientific American. His first reflection is that 'these brackets, it is true, are quite similar to those in common use for many years for the support of the stern bearings of twin-screw shafts, and if there were no better method of accomplishing such support, criticism would have no claim against them, but as it is well known, there is a better way of attaining the end sought, and therefore, in a cruiser where speed at a critical time may involve her own safety and that of her personnel, such improved methods should have been adopted.' If the author of this strange article finds that the stern work of the Olympia is similar to those in common use, why has he selected that cruiser instead of some of those built at Cramp's yard? He knows very well that the Olympia approaches nearer to the most modern method of supporting twin-screw shafts, than that of any other cruiser afloat.

"The only difference between the stern work of the St. Louis, or any of the most recent Atlantic liners built since the disaster to the City of Paris and the Olympia, is simply in there being no opening through the deadwood of the cruiser, the shafts being further apart, and the structure carrying the shafts being built on normal lines, instead of being built horizontal, and I am convinced that with the greater projection necessary where there is no well, being built on normal lines, offers less resistance than it would do if built horizontal. The only saving effected by ending the tube structure on a horizontal beam, is that it costs less, but could hardly have been carried out in the Olympia's case with 9 feet 6 inches of projection. There must be in every case a certain length of shaft tube between the stern bearing and the stuffing box. That of the Olympia is very little more than usual in single screw vessels, is less by far than any other twin-screw vessel in the navy, and probably little more than that of the St. Louis. The author of this article refers to the extra buoyancy obtained by the displacement of the shaft tubes by the new construction. I can not see why there should be any difference in buoyancy or displacement, whether the projection carrying the shafts is horizontal or normal. The extra buoyancy obtained on the Olympia by carrying the shaft tubes out to the strut and making them large enough to have the stuffing box outside the ship, was 57,216 pounds.

"Why did not this writer compare the stern work of the St. Louis with the cruisers built at the same yard? It would have been a better showing for what he is pleased to term a better way of attaining the end sought. Why did not the experts of the Cramp company propose this better construction to the navy department? The bureau chiefs are not so set in their own designs but that they are willing to adopt anything better that may be presented. It is a pity that the Cramp company did not know of this better construction in time to save the department from taking a step (if not a tumble) backward in the case of the Olympia. Judging from the direction taken by recent discussions on the form and position of projected structures on the outside of vessels under water, and from recent tank experiments, the normal position as opposed to the horizontal for structures carrying propeller shafts, is that of least resistance, and, after all, the Cramp company may have to take another step forward to get alongside of the Olympia."

Entrance and Clearance of Vessels.

Editor MARINE REVIEW: In order that some observations which I desire to submit to your valuable journal may be fully understood, I shall be grateful if you will reprint the following, which I have cut from your issue of May 9:

"Collector of Customs Austin of Toledo is worried over the fact that vessels clearing light from lower Lake Erie ports drop into Toledo and after taking on coal cargoes for the upper lakes depart without making a report of them. Of course they do, and the same thing happens at other ports as well as Toledo. Mr. Austin must be new in the customs business. He will learn later on that this practice is permitted by defective customs laws, that not only deprive Toledo of a full share of credit in the lake business but actually prevent the collection of reliable statistics regarding any part of the commerce of the lakes, excepting the business of the St. Mary's Falls canal, which is looked after by the war department, and iron ore shipments, which are readily accounted for through officers of the railway companies. Repeated efforts have been made, so far without success, to amend these defective customs laws. Any effort that Mr. Austin may make in this direction will be commended by a great many people in the vessel business who are anxious to secure reliable statistics of lake commerce through the customs service. Opposition comes from managers of a few package freight and passenger lines that have boats trading at numerous intermediate ports on different lake and river routes."

I was not aware that Mr. Austin had been in a perspiration concerning the happy-go-easy method, or the utter want of method on the part of the government, in making a record of the commerce of the lakes. If Mr. Austin is cool under his collar I am surprised. It is a just cause for universal astonishment and indignation that the United States treasury department, and all the great lake transportation organizations, are simply willing that no accurate account be kept of the greatest internal commerce on earth. In the last congress, Hon. Byron F. Ritchie introduced a bill requiring cargoes to be cleared at the port of loading and entered at the port of delivery. The bill was referred to the committee on commerce, where it met opposition from ship owners all along the lakes, including Cleveland, and from the treasury department. The latter was undoubtedly induced by the former. And what was the basis of this opposition? Nothing but the necessary calling at the custom house by the master of the vessel who sits about in port while his vessel is discharging or loading, or his agent, and the payment of twenty-five cents for the papers. The basis, it will then be seen, is unworthy the great ship owners and managers of the lakes, but it was sufficient to prevent a report from the committee and the bill was killed. Whenever the pride of the Cleveland Chamber of Commerce in accurate statistics of the commerce of the lakes becomes suitably aroused, the other Lake Erie exchanges will doubtless co-operate with them for a reformation, but Toledo is not likely to again attempt it alone.

DENISON B. SMITH,

Toledo, O., May 20, 1895.

Hay Lake Buoys.

Editor MARINE REVIEW: Referring to Commander W. W. Mead's communication in your issue of the 16th inst., it may not be out of place with me to say a few words about Hay Lake channel. The currents of the new channel will not interfere with any craft, if the channel is properly buoyed. He says that masters have been running the channel when it was too dark to see the buoys, but the trouble has been due to the fact that there were no buoys to see. The Buffalo Express of recent date had an illustrated article showing the North Wind aground at the head of Hay Lake channel, which included the stakes, showing the position they were in when the Selwyn Eddy, Kearsarge and North Wind went aground at the same place.

Buoys were not properly placed in position in Hay Lake channel until the vessel interests had suffered $75,000 damage, and, in fact, are not yet properly placed. The second black stake at the foot of the dyke is about 150 feet south of channel and there is a bar at this point of boulders and mud, which is very liable to cause serious damage. There are no buoys from the turning stake in Little Mud lake up to the first two stakes at the foot of the dyke. More stakes are certainly needed at this point. There should be at least five additional pairs of stakes placed from the turn at the foot of Hay lake and leading on to Nine-Mile point.

The insufficient knowledge on the part of masters of vessels to which Commander Mead refers had no reference to currents but was due to the scarcity of buoys. The black can buoy at the head of the new channel was not placed there until three steamers had grounded and suffered serious damage. Why was this the case? As regards the hiring of local pilots to take vessels through the new chaneel, it can truthfully be said that this would not be at all necessary if the channel was properly buoyed.

THOMAS R. HARVEY,
Proprietor Harvey's Marine Bureau.

Sault Ste. Marie, Mich., May 21, 1895.

"I will be the naval architect" said Capt. James Davidson when asked as to whether he would employ any special talent upon beginning the construction of steel vessels at his West Bay City yard this summer. Capt. Davidson is of the opinion that the number of skilled workmen required to build wooden boats is greater than is needed in the building of iron or steel ships, and he says he will employ only one high-priced man to look after the work of erecting steel ships. He does not think it will be necessary to increase his present office force. The two wooden steamers on the stocks at his yard will be launched between the first and fifteenth of June and the two car ferries will go into the water later in the month. The steamers are to be called Rappahannock and Sacremento and are each 330 feet over all and 43 feet wide. Capt. Davidson evidently does not expect to find purchasers for them this season, as he has just made a contract to carry an additional amount of 100,000 tons of ore from the head of Lake Superior at 80 cents, the time of delivery running to about Nov. 1. The car ferries which are building for the Wisconsin & Michigan Railway, to run between Pensaukee and South Chicago, will for a time be towed by tugs that will be chartered for the purpose, but it is probable that steamers specially suited to towing them will be built later.

A survey of Cleveland harbor and approaches is being made by the U. S. S. Michigan.

CAPTAINS AND MATES ARE INVITED TO CALL AT THE OFFICE OF THE MARINE REVIEW, AND LOOK OVER THE SAILING DIRECTIONS OF LAKES SUPERIOR, HURON AND MICHIGAN, PUBLISHED BY THE HYDROGRAPHIC OFFICE.

Suggestions Regarding the Sound of Fog Signals.

Reference has been made in the REVIEW on several occasions to the reports of Major William R. Livermore, corps of engineers, U. S. A., on fog signal experiments. Major Livermore has for a long time been engaged in scientific pursuits under the direction of the United States light-house board. "It has been stated repeatedly," he says, "and confirmed by sufficient observations, that fog, rain, snow, etc., do not of themselves obstruct the passage of sound. They may tend to increase or diminish its intensity, according as they affect the temperature or velocity of the air. Sound is generally transmitted better in cold than in warm air, because it is more homogeneous; for the same reason it is generally transmitted better through a fog, because when the air is near the point of saturation a slight change in temperature might cause so much evaporation or condensation as to reduce its range by one-half. Snow falling through the air acts in a similar way to check the minute currents and eddies. Sound travels only about one hundred times as fast as a lively wind, and the wave length is as great as the width of the aperture of the trumpet; accordingly it is not all thrown out in the direction of the axis, as the rays of light from a lens or reflector, but spreads out on every side by diffraction. Sound travels a little more rapidly in hot than in cold air; in wet than in dry air; a little more rapidly with the wind than against it.

"No definite instructions can be prepared for mariners to insure against accident. Even the best of seamen are often harrassed by cares and duties that divert their attention for the moment, and in case of disaster the most conflicting accounts have been given of the aberrations of the audibility of fog signals. The noises upon the ship, the noise of the wind and waves, and the condition of the nerves, all affect the audibility of fog signals to a degree that can best be appreciated by studying the evidence. It is impossible to navigate in bad weather without more or less risk. Mariners should study the principles that affect the audibility of fog signals, just as they study the art of navigation, and should notice the wind and temperature whenever they hear fog signals. They should only depend upon hearing them at short range, unless the wind and weather favor the sound, but if they do hear them at long range they should make what use they can of them. They should remember that it does not require a very heavy wind to drive back the sound; that a southerly wind generally drives back the sound more than a northerly or an easterly one; that about the time of a change in the wind the sound is not generally heard as far as usual; that when the upper and lower currents of air run in different directions, or when the upper sails fill and the lower sails flap, or conversely, the signal is not to be depended upon; that a very heavy wind tends to break up all sound; that if a vessel is traveling with the wind the signal will probably be heard better than if it were traveling against it; that behind a hill or an island the signal may be heard better at a distance than nearer to the obstacle; they should bear in mind that it is hard to locate a feeble sound, and even a strong one may appear to come from the wrong direction if it is obstructed by objects near it, even by objects not directly in the straight line between the observer and the signal; that neighboring cliffs and sails sometimes reflect the sound; that the sound may be cut off entirely by passing vessels; that to estimate the direction of the sound the head should be turned rapidly from side to side, so that the sound may reach the ears alternately."

An Incident of the New White Law.

Before the supervising inspectors decided that the smaller class of tug boats would be permitted to comply with the White bill regulations by using a 30-pound bell, a representative of a local ship chandlery firm was in a small Lake Erie port and came across a tug about 20 feet long. He proceeded to instruct the owner in the new law.

"So I have to put a bell on the steam launch, eh?"

"I have nothing to do with it. I am just telling you the requirements of the law."

"What kind of a bell?"

"Sixty pounds, good bell metal, and we warrant our bells to stand government inspection."

"Sixty pounds! Sixty pounds?"

"That's the law!"

"Maybe you sell cork-jackets too?"

"Yes, sir! Warranted genuine granulated cork. Will float in water thirty days without becoming water-logged."

"Make them any size?"

"Regulation size—"

"You might send me one cork-jacket big enough to put around the launch so as to keep her afloat when we put that sixty-pound bell on."

Big Harbor Project.

The city of Seattle, Wash., has under consideration an engineering work of great magnitude, having for its object the improvement of the harbor. It is proposed to cut a ship canal from the harbor through the tide flats at the head of Seattle bay and across the high land on which the city is built into Lake Washington, using the material excavated in filling up above high tide about 1,500 acres of submerged land lying adjacent to the business section of Seattle. These lands belong to the state, and the contracting company receives a mortgage on the filled lands for the cost of filling and 15 per cent. added as compensation, the project being thus made feasible. The deepest cut on the line of the canal will be 308 feet, and the canal will carry 26 feet of water at low tide. The cost of the work will reach $7,000,000, and the period of construction will be about six years. The result will be a fresh water harbor and other advantages which will greatly improve the position of Seattle as a commercial city. The citizens of Seattle have raised $500,000 to guarantee the cost of locks and other works on the canal, which is not provided for by the law under which the company acts.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on May 18, 1895:

	Wheat, bushels.	Corn, bushels.
Chicago	20,112,000	3,604,000
Duluth	10,063,000	.....
Milwaukee	306,000	.....
Detroit	433,000	154,000
Toledo	551,000	370,000
Buffalo	1,881,000	290,000
Total	33,346,000	4,418,000

A Case of Rolling Stones.

The Marine Journal of New York is responsible for this yarn:

"A leak which developed on the Massachusetts fishing schooner Willie L. Swift recently led to the discovery of a curious cause. It was found that at some time in the past, presumably prior to her launching, a couple of stones, weighing about seven pounds each, had found their way between the timbers, nearly abreast the mainmast, beneath the ceiling. The stones, kept in almost constant motion by the rolling of the vessel when at sea, had traveled from side to side in their narrow prison and had gradually worn through the stout oak garboard planks. The groove worn by the rolling stones extended well up on the planks either side of the keel, some being cut through almost to the paint on the outside, the veriest shell of wood alone preventing the inrush of the sea. It was a wonder that the vessel had not gone down in some of the many gales to which she had been exposed in the past. She is twenty years old and of ninety-six tons register."

In General.

It is estimated that the yacht Defender will cost $200,000.

Tug owners at Buffalo and Tonawanda have broken over agreements of previous years, and tugs from both places are now running out into the lake for tows and doing the work at prices that are very much lower than those prevailing during previous seasons. Vessel owners feel, anyhow, that it is about time for a reduction in towing charges at Buffalo.

Prof. W. F. Durant, of the school of marine engineering and naval architecture, Cornell university, has an article in the June number of Cassier's magazine on "Electricity for Marine Propulsion." One of the interesting features of this magazine is the publication, with each article, of the portrait and a brief biographical sketch of the author, thus pleasantly introducing reader and writer to each other.

The revenue cutter William Windom, which is being built by the Iowa Iron Works of Dubuque, Ia., is about ready for launching. This vessel is 170 feet over all, 27 feet beam and 14 feet hold, and will have triple expansion engines with cylinders 11¾, 16½ and 26½ inches diameter by 24 inches stroke, which will be supplied with steam by a Scotch boiler 12 feet in diameter and 16 feet long. The contract price for the completed vessel is $98,500. She is intended for service on Chesapeake bay. Nearly all the material entering into her construction was made by the Carbon Steel Company of Pittsburg.

Figures prepared by John Birkenbine, iron ore expert of Philadelphia, show that the production of ore in this country in 1894 aggregated 11,879,679 gross tons. More than 65 per cent. of this (7,755,494 gross tons) was produced in the Lake Superior region. Although the production throughout the country in 1894 was greater than that of 1893, it was below the average yearly production from 1889 to 1892 inclusive, which was 15,360,482 gross tons. The figures for three years past are: 1894, 11,879,679 gross tons; 1893, 11,587,629 gross tons; 1892, 16,296,666 gross tons. The production of 1892 represents the maximum for all time past. Michigan continues to be the largest producer among the states, holding this record for six years past. The average value of ore at the mine in 1894 was but $1.14 a ton, against $1.66 a ton in 1893.

Canal Commerce and Carrying Charges.

The following tables, prepared by Assistant United States Engineer L. C. Sabin of Sault Ste. Marie, are printed as matters of record. They are based on official reports of both the St. Mary's Falls and Suez canal traffic. Figures in the first table, showing the average size of vessels using both canals, are very interesting. Of course the average size of vessels passing the Suez is greater than the average found at Sault Ste. Marie. Ten years ago the average at Sault Ste. Marie was 602 net registered tons, while last year it was 994 tons. The average size of vessels passing through the Suez canal in 1885 was 1,784 net registered tons, against 2,398 tons in 1894. In the second table, indicating the cost of carrying freight on the lakes, it is found that the cost per mile-ton, including unloading charges, was $2\frac{3}{10}$ mills in 1887, against $\frac{99}{100}$ mill in 1894.

COMPARISON OF TRAFFIC THROUGH THE ST. MARY'S FALLS CANAL AND THE SUEZ CANAL.

YEAR.	Number of vessel passages, including unregistered craft.		Net registered tonnage passing.		Mean net registered tonnage of vessels.	
	St. Mary's Falls canal.	Suez canal,	St. Mary's Falls canal.	Suez canal.	St. Mary's Falls canal.	Suez canal.
1885	5,380	3,624	3,035,937	6,335,753	602	1,784
1886	7,424	3,100	4,219,397	5,767,656	593	1,861
1887	9,355	3,137	4,897,598	5,903,024	574	1,882
1888	7,803	3,440	5,130,659	6,640,834	701	1,930
1889	9,579	3,425	7,221,935	6,783,187	790	1,980
1890	10,557	3,389	8,454,435	6,890,094	834	2,033
1891	10,191	4,207	8,400,685	8,698,777	863	2,068
1892	12,580	3,559	10,647,203	7,712,029	883	2,167
1893	12,008	3,341	8,449,754	7,659,060	790	2,292
1894	14,491	3,352	13,110,366	8,039,106	944	2,398

NOTE—St. Mary's Falls canal is open to navigation during a season of about 225 days; Suez canal open during full year.

COST OF CARRYING FREIGHT ON GREAT LAKES, AS OBTAINED BY DISCUSSION OF TRAFFIC THROUGH ST. MARY'S FALLS CANAL.

YEAR.	Total mile-tons.	Total cost of transportation.	Cost of carrying per mile-ton.*
1887	4,458,544,804	$10,075,153	2.3-10 Mills.
1888	5,173,132,972	7,883,077	1.5-10 "
1889	5,940,646,352	8,634,247	1.5-10 "
1890	7,207,299,415	9,472,215	1.3-10 "
1891	7,292,462,269	9,849,023	1.35-100 "
1892	9,222,773,938	12,072,851	1.31-100 "
1893	8,980,310,240	9,957,483	1.1-10 "
1894	10,927,871,324	10,798,310	99-100 "

* Includes unloading charges.

New Chart of the Entire Chain of Lakes.

Another pilot chart of the lakes has just been issued by the hydrographic office. It is 40 by 26 inches in size and printed on heavy paper. The chart itself is the most complete as yet published, as it includes every harbor, town and island of any importance at all, but other information included on the big sheet is of even greater value. There are tables giving dimensions of all lake dry docks and all canals in the tributary waters of the lakes, as well as a special side chart with tables showing dimensions of all canals on the St. Lawrence. Three tables of distances taking in ports on Lake Superior, ports on Lakes Huron and Michigan and ports on Lakes Erie and Ontario are also included. Weather signals, lists of display stations maintained by the weather bureaus of Canada and the United States, and brief rules for the use of oil to protect vessels in stormy waters are also worked into the spare spaces on the chart. The chart is to be sold at 50 cents a copy and may be had from the MARINE REVIEW.

Wooden Patch on a Cylinder.

Chief Constructor Hickborn of the United States navy has added an interesting story to the many that have been told of machinery repairs at sea. The June number of Cassier's Magazine will contain a biographical sketch, with portrait, of the chief constructor, written by R. G. Skerrett, and also an article by him on the "care of steel ships." In this article Mr· Hickborn says:

"With the several noteworthy repairs fresh in mind that have, of late, been made and described in the cases of broken-down machinery at sea, it is interesting to recall an experience of older standing, which occurred on a steamer in eastern waters a number of years ago and which is quite as illustrative of ready engineering expedients as any of later date. On the ship in question, while going at full speed, the engines suddenly gave a loud crack, as if something had burst, and then came to a stop. The chief engineer hurried into the engine room and examined everything, without finding any cause for the accident. The valve castings, too, were inspected, without any clue to the trouble, but on taking off the low pressure cylinder cover, a hole was discovered in the side of the cylinder, measuring about 3 feet square, and the pieces of metal from the wall were found lying on the top of the piston. The weather being squally no time was to be lost, and the happy idea occurred to the chief engineer to make a wooden patch, which he proceeded to do by first getting a piece of wood, 2 inches thick and 6 inches wide, which he put between the jackets and the cylinder face, bedding it close at both ends and holding it by means of countersunk screws through the cylinder face. Six such pieces were put in and secured in this way, and then some hardwood was used to make the recess still remaining flush with the working face of the cylinder, the hardwood being screwed to the 6-inch pieces first mentioned. Only seven hours were taken up in making this ingenious repair, and the cylinder cover being put back in place, the engines were tried with about forty five pounds of steam, and were allowed to work at half speed until the steamer was brought safely into port."

Three Revenue Cutters.

On June 1 the revenue cutter service, navy department, will advertise for bids on three steel steam vessels, for which appropriations have been made sufficient to allow about $175,000 for each boat, including, of course, the cost of preparation of plans, inspection, etc. One of these cutters is to be stationed at Milwaukee; another goes to the New England coast and the third is for Pacific coast service. In the plans and specifications as they have finally been decided upon, all three of the vessels will be of dimensions that will probably not permit of passage through the lower St. Lawrence canals, so that it is unfortunate that lake ship builders will have an opportunity to bid on only one of them.

A description of the boat that is to be statiened at Milwaukee will serve for the other vessels also, as differences will not be important. She will be 205 feet over all, 188 feet water line, 32 feet beam and 16 feet depth of hold. Her displacement at a mean draft of 10 feet 10 inches will be about 900 tons. She is expected to maintain an average speed of 16 knots an hour when the engine is developing about 2,000 horse power. She will be constructed of the best open hearth steel, the requirements for which are that it shall have a tensile strength of at least 55,000 pounds per square inch and an elongation of not less than 25 per cent. in a length of 8 inches. Samples cut from the plating must be able to bend cold, flat over on themselves, without showing signs of fracture. The cabin and officers' quarters will be located in the after part of the vessel. The crews' quarters will be forward, while the ship's galley, as well as the carpenter shop, engineer's workshop, armory, executive officer's office, bath rooms, etc., will be located in an iron house on the main deck, in the forward part of which will be the pilot house and chart room. An electric light plant capable of producing a current of 100 amperes at a pressure of 80 volts will be located in the upper engine room. A search light of 25 amperes capacity will be carried on the pilot house. The armament will consist of a battery of rapid firing guns and provision will be made for carrying a torpedo outfit. The vessel will be supplied with steam steering gear, steam capstan and steam windlass and will be heated throughout by steam.

Engines will be triple expansion, having cylinders 25, 37½ and 56½ inches diameter and a common stroke of 30 inches. The high pressure cylinder will be fitted with a piston valve and the intermediate and low pressure cylinders each with a double ported slide valve, all to be operated by the Stephenson link motion with double bar links. The crank, intermediate and propeller shafts will be of forged mild open-hearth steel, as will also the front columns, piston and connecting rods. There will be a surface condenser, containing about 3,000 square feet of cooling surface, which will form a part of the engine housing. There will be a pair of vertical, independent, single-acting air pumps, operated by one steam cylinder; the pumps will discharge with a feed tank. The circulating pump will also be independent and of the centrifugal type. The main and auxiliary feed pumps will be of the vertical, duplex type. Steam will be supplied by four single ended boilers of the Scotch type, each 11 feet 6 inches long. Each boiler will have two corrugated furnaces, the total grate surface being 185 square feet. The total heating surface will be 5,300 square feet. The propeller will be of bronze, 13 feet pitch and four bladed. When the engine is making 160 revolutions the calculated speed will be about 20.52 knots, from which deducting the liberal allowance of 20 per cent. for slips, the actual speed of the vessel will be about 16.42 knots maximum. The coal capacity will be such as to give the new cutter a steaming radius of 2,500 knots at full speed and 4,000 knots when steaming at the more economical speed of 10 knots per hour with one boiler in use.

The impression has in some way gone out among vessel owners that Howard & Co., coal dealers of Buffalo, are connected with the Lehigh Valley company as lake shippers. This is not true, and President Livingstone of the Lake Carriers' Association has so informed vessel owners, as far as possible, in all parts of the lakes. Howard & Co. are not lake shippers of coal and are not connected in any way with lake shippers at Buffalo, but simply supply fuel at the Lehigh Valley docks, or by barge, at the lowest prices for coal of good quality.

MARINE REVIEW

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,341 vessels, of 1,227,400.72 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons and over that amount on the lakes on June 30, 1894, was 359 and their aggregate gross tonnage 634,467.84; the number of vessels of this class owned in all other parts of the country on the same date was 316 and their tonnage 642,642.50, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1894, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels	1,731	843,239.65
Sailing vessels	1,139	302,985.31
Canal boats	386	41,961.25
Barges	85	39,214.51
Total	3,341	1,227,400.72

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
Year ending June 30, 1890	218	108,515.00
" " " 1891	204	111,856.45
" " " 1892	169	45,168.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
Total	872	406,976.28

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

(From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			SuezCanal.		
	1894.	1893.	1892.	1894.	1893.	1892.
No. vessel pass'ges	14,491	12,008	12,580	3,352	3,341	3,559
T'n'ge, net registd	13,110,366	9,849,754	10,647,203	8,039,106	7,659,068	7,712,028
Days of Navigat'n	234	219	223	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

THE FACT that the Canadian parliament is disposed to grant to the Canada and Michigan Tunnel and Bridge Company the right to bridge the Detroit river at Windsor is no indication that the stand taken by the United States government on this question is liable to change, at least for a great number of years to come. Exhaustive investigation made by the engineer corps of the army have resulted in reports against a bridge of any kind over the main channels between Lakes Huron and Erie, and congress has invariably supported the war department in this stand. In connection with renewed agitation of this subject, it may be well to understand the policy of our government, which of late years has been strengthened by the vast sums of money expended for river and harbor improvements. The navigable waters of the country are the nation's highways and are under control of the government. The riparian owner may possibly make some claim of ownership to the bed of the waterway by erecting wharves and landings which do not impede the navigation of the waterway, but here his privilege ends and the rights of the public begin. The legislation most interesting and best illustrating the position which the government has assumed regarding its waterways, is that relating to its broad denial of the right of any individual, corporation, municipality, etc., to in any manner interfere with the free and safe navigation of any navigable waters of the United States without authority from the government. The secretary of war has authority to establish harbor lines wherever he may consider it desirable, beyond which no piers or wharves or other constructions may be built except as he may prescribe. No bridge can be built across any navigable water course without the approval of the secretary of war and under his supervision as regards details. Even wrecks and sunken obstructions come under these provisions of law. Any wrecked vessel which for the period of sixty days has been permitted by its owners to obstruct or endanger navigation may be destroyed and removed by the government without payment of any claim for damages to the owners arising from the destruction of such vessel or cargo.

REFERRING to the sinking of the steel steamer Cayuga as a result of collision in the Straits of Mackinac two weeks ago, the Marine Journal of New York says: "Lake ship builders have not yet attained to the ocean standard of water-tight bulkheads and modern methods of construction. Lake shipping men have not been slow in boasting about their immense facilities for the rapid loading and dispatch of cargoes, etc., but it is evident that had their vessels as many adjuncts for seaworthiness and preventives of disaster as do salt water steamships, the effect might be to secure surer if slower transportation." This is certainly rubbing it into Capt. W. P. Henry, manager of the Lehigh Valley line, who had his salt-water eye on every rivet that went into the Cayuga when she was built a few years ago, and who is at all times proud of the experience which he gained in early life on ocean-going ships. But to be earnest in this matter, the Cayuga is probably one of the strongest steel freight vessels ever constructed in this or any other country, and the writer of the above paragraph is not well posted when he talks of bulkhead systems for freight vessels to prevent loss from collision. There is a great deal of poetry about bulkheads and unsinkable ships, but it would seem that the editor of the Marine Journal should by this time have seen enough of the practical side of ship building, as regards freight vessels, to not indulge in any such nonsense as that quoted above.

DENISON B. SMITH, secretary of the Toledo Produce Exchange, sends the REVIEW a communication that may tend to increase interest in the enactment of a law to regulate and record the entrance and clearance of vessels at lake ports, so as to secure reliable statistics of commerce. It is not necessary that there should be any charge for the services of customs officials in this regard. The position of the REVIEW in this matter is fully understood. If the commercial bodies of lake cities unite in trying to secure the passage of a law that will not result in delays to vessels while reports of cargoes are being made, they can readily overcome objections that may be made by a few vessels owners who are unwilling to make a little sacrifice in order that a full report of the lake business of different cities may be obtained each season.

IN TWO important respects the building of the North sea-Baltic ship-canal, which is to be opened by the German government next month, is remarkable. A sum of money, about $40,000,000, was granted for the work, and this sum has not only not been exceeded, but there is actually a balance of about $175,000. The second point is that the work is to be completed within the space of time estimated. It would be difficult to find a parallel case in enterprises of such vastness.

Rise and Progress of River and Harbor Improvements.

At the beginning of this century Philadelphia was the seat of the nation's capital, and at that time the first appropriation ever made by congress for the improvement of waterways provided for the erection of public piers in the Delaware river at a cost of $30,000. In 1822 the Delaware breakwater was commenced with an appropriation of $22,700, a work which has been continued up to the present time at a cost of $2,728,000. The first river and harbor bill was passed during the administration of John Quincy Adams, and aggregated $150,000, applicable to twenty localities. As a comparison, that of 1892 aggregated about $22,000,000, and was applied to 425 localities, exclusive of surveys, etc., at 145 localities. From 1826 to 1838 congress continued to make annual appropriations for the improvement of a large number of rivers and harbors, expending during that interval about $9,000,000. At the end of this period a change of public policy, extending to 1866, took place, and only three regular river and harbor bills were passed during that time. In 1841, however, it was provided that for each new state thereafter entering the Union 500,000 acres of public land should be set aside, the proceeds from the sale of which should be applied by the state to the building of bridges and the improvement of roads, canals and water courses. The only provision was that the United States should have the right to transport mails, troops and munitions of war over such canals, roads, etc., free of toll. The interval of twenty-six years above mentioned, during which so little was done in the improvement of national highways, extended to the close of the civil war. From this time a new departure in river and harbor improvements took place, and a policy was originated which has steadily expanded ever since. During the last twenty-nine years, 94 per cent. of all the money spent for river and harbor improvements has been appropriated. The total amount appropriated from 1820 is $262,845,900.—From a lecture before the Franklin Institute by I. Y. Schermerhorn, C. E.

During one day of last week, May 13, eighty-eight boats, aggregating 91,357 registered tons, were locked through the St. Mary's Falls canal, exceeding by 4,653 tons the heretofore banner day, which occurred June 18, 1894, when boats aggregating 86,704 tons passed the canal.

MEMBERS OF THE SHIP MASTERS' ASSOCIATION WHO DO NOT FIND IT CONVENIENT TO CALL AT THE PLACES MENTIONED IN A RECENT ISSUE OF THE REVIEW TO RECEIVE COPIES OF THE 1895 DIRECTORY ADDRESSED TO THEM, CAN OBTAIN A COPY BY CALLING AT THE OFFICE OF THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND, O.

Around the Lakes.

Hard coal shipments from Buffalo last week amounted to only 60,475 net tons.

William Maxfield, old time lake vessel master, died at Vermillion, O., Monday. He was eighty-two years of age.

A contrivance of some kind will be erected back of the Buffalo fog signal, with a view to directing the sound lakeward and thus overcoming objections to the noise in the city.

B. B. Inman of Duluth has bought from C. L. Ring the schooner Chas. L. Ryan of the Belle P. Cross tow, the other vessels of which, the Cross, Chicago Board of Trade and Clement he already owned.

In Vol. XI, No. 13 of the REVIEW will be found engravings and a description of the composite light-ship for the construction of which Geo. Warrington of Chicago recently secured a contract from the light-house board.

Islander is the name selected for a wooden excursion steamer launched by E. W. Heath of Benton Harbor, Mich. The boat was built for Geo. T. Arnold of Mackinac Island at a cost of about $18,000 and is intended for excursion business in the vicinity of the straits.

When the steel steamer Chili takes her place in the Lackawanna line, she will be commanded by Capt. A. B. Drake, who has been in the Thomas Maytham. Capt. Joseph Hulligan of the Brazil will go to the Maytham, and James Connors, who has been mate of the Brazil, will be given command of her.

A third bulletin for the present season calling attention to changes in aids to navigation, shoal spots and obstructions of different kinds has just been issued by the hydrographic office. It is known as "Notice to Mariners No. 3." Copies of it may be obtained free of charge at the MARINE REVIEW or at the branch hydrographic offices in Cleveland and Chicago.

Gen. Poe of Detroit has the sympathy of vessel owners in the death of his son, Charles C. Poe, who was thirty-six years of age and had a very prosperous future. Death occurred after a very short illness in New York, where Mr. Poe was engaged as comptroller of the East Jersey Water Power Company. He was a graduate of the Annapolis naval academy.

Geo. D. Fellows, writing to the REVIEW from Racine, says: "Judging by the breakers during the recent storm, when the schooner Kate Kelley foundered with all on board, it would seem that the can buoy on Racine reef is about half a mile inside the shoal spot, and vessel masters will do well to give the buoy a wide berth. It will also be well to look out for the Kelly's spars, which are above water, about two miles E. N. E. of Wind point."

Another steel boat, the twin-screw Canadian passenger steamer Campana, is being taken down the St. Lawrence canals from the lakes in two parts, to be put together again at Montreal and fitted up for the West Indies and Gulf trade. The Campana is not, however, a lake-built boat. Previous to being purchased by Canadians several years ago and brought to the lakes by the same method as that now adopted in floating her through the canal locks, she was for many years engaged in the South African trade from London.

New lake vessels registered in the office of the United States commissioner of navigation during the week ending May 11, were: Sail—Granada, Port Huron, Mich., 1,729.89 tons gross, 1,643.52 net, No. 86,317; Charles Chambers, Detroit, Mich., 90.12 tons gross, 86.70 net, No. 127,075; Albion, Grand Haven, Mich., 5.81 tons gross, 5.52 net, No. 107,158. Steam—Argo, Cleveland, O, 721.26 tons gross, 490.26 net, No. 107,157; I. Watson Stephenson, Port Huron, Mich., 639.26 tons gross, 501.08 net, No. 100,597; Petrel, Buffalo, N. Y., 34.14 tons gross, 23.22 net, No. 150,696.

A notice from the light-house board describing the location of new buoys in Hay Lake channel, which were referred to in the last issue of the REVIEW, contains the following additional information: "In running down the St. Mary's river it will be necessary in turning into Hay Lake channel for vessels to pass quite close to the black can buoy, in order to avoid being swept by the strong current onto the dangerous shoal on the east side of the new channel. In making the turn at the lower or south end of Hay lake into the Middle Neebish cut, vessels should avoid getting too close to the red buoys, as the current will tend to carry them onto the shoal.

LISTS OF MASTERS AND ENGINEERS OF LAKE VESSELS, TOGETHER WITH NAMES AND ADDRESSES OF MORE THAN A HUNDRED FIRMS AND CORPORATIONS CONTROLLING LINES OF FREIGHT AND PASSENGER STEAMERS ON THE LAKES, MAY BE HAD IN PAMPHLET FORM FROM THE MARINE REVIEW, NO. 516 PERRY-PAYNE BUILDING, CLEVELAND, FOR 25 CENTS.

AN ARTISTIC PHOTO OF THE NORTH WEST, HANDSOMELY MOUNTED, SENT TO ANY ADDRESS FOR 50 CENTS, BY THE MARINE REVIEW. MONEY RETURNED IF YOU ARE NOT SATISFIED.

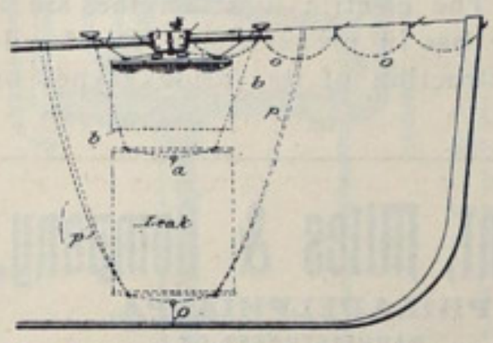
Illustrated Patent Record.

SELECTED ABSTRACTS OF SPECIFICATIONS OF A MARINE NATURE—FROM LATEST PATENT OFFICE REPORTS.

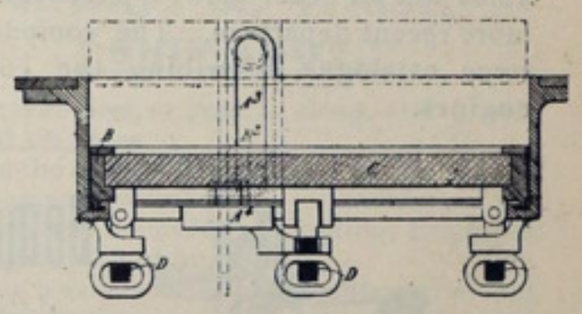
539,023. Apparatus for Stopping Leaks in Ships at Sea. William F. Beart, Godmanchester, England. Filed Oct. 29, 1894. Serial No. 527,258.

Claim. In an apparatus for stopping leaks in ships, a flexible, skeleton or reticulated mat, a carriage adapted to be moved from place to place to which the upper end of the skeleton mat is secured, devices for supporting the mat when folded, ropes attached to the lower edge of the

539,023. APPARATUS FOR STOPPING LEAKS IN SHIPS AT SEA.



539,315. SHIP'S LIGHT AND AIR-PORT.



skeleton mat and adapted to be drawn taut to hold it against the side of the vessel over the leak, and a water-tight cover mat adapted to be suspended from the top of the vessel and provided with ropes at its lower end which, when drawn taut, hold it securely against the skeleton mat.

539,315. Ship's Light and Air-Port. Thomas Utley, Liverpool, England. Filed Dec. 18, 1894. Serial No. 532,225.

Claim. In a ship's side light, the combination of an inwardly flanged fixed frame, a jointing ring in the flange, a glass-holder furnished with pivot pins, and with screw retaining bolts, guide channels in the fixed frame to receive the said pivot pins, gaps in the flange opposite the pivot pins, hinged pieces to fill said gaps and thus complete the flange and jaws on said hinged pieces to engage with the screw retaining bolts of the glass-holder.

Trade Notes.

An advertisement from the life saving service elsewhere in this issue calls for bids for the construction of twelve 34-foot life boats.

A patent auxiliary boiler for the light-ship to be built by Geo. Warrington of Chicago, will be constructed by the Fitzgibbon Boiler Co. of Oswego, N. Y.

Workmen from the Frontier Iron Works, Detroit, are engaged in putting three fore-and-aft compound engines into one of the Conneaut-Port Dover ferry boats, being built by the Craig Ship Building Co., Toledo.

A Sheriffs wheel of 9 feet 6 inches diameter has been ordered for the steamer City of Kalamazoo, and one of 7 feet 4 inches diameter for the steamer Charles McVea. Both will be put on at the works of the Sheriffs Co., Milwaukee.

The manager of the Champlain Transportation Company, Burlington, Vt., in ordering two wheels for the Mohican and Valcour says that the good results obtained from the Trout wheels used on two other steamers is the cause of this purchase.

A recent issue of one of the Detroit papers contains a lengthy notice of a display of marine pictures, marine glasses, thermometers etc., made by L. Black & Co., No. 145 Woodward avenue, Detroit. This firm carries a very large stock of specialties of this kind.

As an indication of the distant markets in which a good article will find sale, a representative of the Parsons & Pattison Chemical Co., Masonic Temple, Chicago, notes that his company is now filling an order for a quantity of chemical water purifier to be carried by mules over mountains to the interior of Mexico.

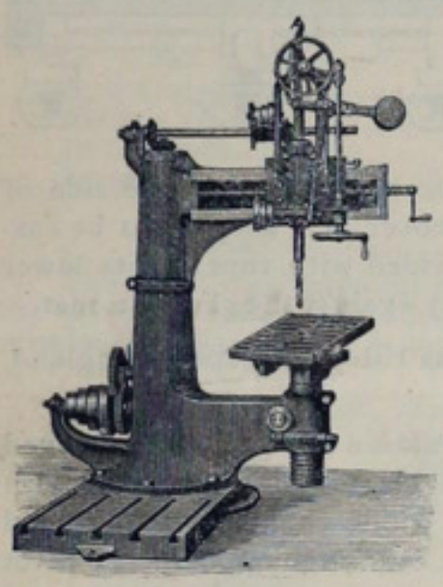
The new boat building by Abram Smith & Son at Algonac is to be completed June 1. Her construction is in accordance with latest improvements in every respect. Her dimensions are 210 feet keel, 36 feet beam and 12 feet hold. Without machinery her capacity will be 1,100,000 feet of lumber on 11½ feet draft. If not sold she will be used as a barge this season.

Borealis Rex is the name of a new packet recently put on the La Salle and Peoria route, Mississippi river. She is commanded by Capt. Percy Swain, who is probably the youngest captain on the river—22 years old. Compound condensing engines are used in this boat, giving her a big advantage over the high pressure boats. D. M. Swain builder of the Rex, shipped a pair of high pressure engines to parties in Idaho, this week, from Stillwater, Minn.

THE MOST ARTISTIC MARINE PHOTO EVER MADE, THE NORTH WEST, PICTURE 4 BY 5½ INCHES, MOUNTED ON HEAVY 8 BY 10 CARD—SEND 50 CENTS TO THE MARINE REVIEW FOR A COPY.

Various Types of Engines and Blowers.

A representative of the Buffalo Forge Co. informs the REVIEW that during the first quarter of 1895 the number of engines built by his company exceeded one hundred. This company makes several types of engines, including single upright and single horizontal for direct attachment to fans for heating work; double upright and double horizontal engines for direct attachment to fans for forced draught and other duty, where a continuous run without cessation is required; direct connected double engines, each of ample capacity to drive the fans independently; single upright automatic enclosed engines and double upright automatic enclosed engines, especially adapted for dynamos on shipboard, as well as center-crank automatic horizontal engines for direct coupling to dynamos and for other power purposes. The electric light engines are a more recent departure. The company has in preparation a very handsome catalogue describing the construction of its various types of engines.



Bement, Miles & Company,
PHILADELPHIA, PA.
MANUFACTURERS OF
Metal Working Machine Tools
For Ship Yards, Railroad Shops, Locomotive and Car Builders, Machine Shops, Rolling Mills, Steam Forges, Boiler Shops, Bridge Works, etc., etc.
Steam Hammers, Steam and Hydraulic Riveting Machines.
New York Office: Taylor Bldg. No. 39 Cortlandt St. E. H. Mumford, Representative.

H. CHANNON COMPANY
AGENTS FOR
RYLANDS BROS.
MANUFACTURERS OF
ENGLISH GALVANIZED STEEL HAWSERS.
24-26 Market Street, CHICAGO, ILL.

THE WILLIAMS & RODGERS CO.
SUPERIOR and SENECA STREETS,
BOAT SUPPLIES
We make special rates to vessel owners on Dry Goods, Bedding, Floor Coverings, Furniture, Kitchen Utensils, Etc.
THE WILLIAMS & RODGERS CO, CLEVELAND, O.

W. & A. FLETCHER CO.
NORTH RIVER IRON WORKS.
Marine Engines, Boilers, &c.
Hudson, 12th and 14th Streets, Hoboken, N. J.
Take Ferry from Foot of West 14th Street, N. Y.

HOWARD H. BAKER & CO.
Ship Chandlers and Sail Makers,
18 to 26 Terrace. BUFFALO, N.Y.

TREASURY DEPARTMENT, U. S. LIFE-Saving Service, Washington, D. C., May 16, 1895. Sealed proposals will be received at this office until two o'clock p. m. of Tuesday, June 4, 1895, for the construction of twelve 34-foot self-righting and self-bailing life boats, with centerboard, six to be delivered in New York city and six in Grand Haven, Michigan. Proposals for either or both lots of boats will be considered. Plans and specifications, together with forms of proposal and full information can be obtained upon application to this office; to the Inspector of Life-Saving Stations, 24 State street, New York city; Assistant Inspector 1st and 2d Life-Saving Districts, Room 148 Post Office Building, Boston, Mass.; Assistant Inspector 9th and 10th Life-Saving Districts, Custom House, Detroit Michigan; or to the Collector of Customs at Cleveland, Ohio, Philadelphia, Pa, or Baltimore, Md. S. I. KIMBALL, General Superintendent. May 23

U. S. ENGINEER OFFICE, 34 WEST CONgress St., Detroit, Mich., May 8, 1895. Sealed proposals for furnishing all labor, materials and appliances, and removing material from moveable dam and from 800-foot lock approaches, also for constructing piers for lock approaches, will be received here until 2 P. M., June 7, 1895, and then publicly opened. All information furnished on application. O. M. POE, Col., Engrs. May 30

TREASURY DEPARTMENT, OFFICE OF General Superintendent U. S. Life-Saving Service, Washington, D.C., May 4, 1895. Sealed proposals will be received at this office until 2 o'clock P. M. of Friday, the 31st day of May, 1895., for furnishing supplies required for use of the Life-Saving Service for the fiscal year ending June 30, 1896; the supplies to be delivered at such points in New York City, Grand Haven, Mich., and San Francisco, Cal., as may be required, and in the quantities named in the specifications. The supplies needed consist of beds and bedding, blocks and sheaves, cordage, crockery, furniture, hardware, lamps, lanterns, etc.; lumber, medicines, etc.; paints, oils, etc; shipchandlery, stoves, etc.; tools, and miscellaneous articles, all of which are enumerated in the specifications attached to the forms of bid, etc., which may be obtained upon application to this office, or to the Inspector of Life-Saving Stations, 24 State street, New York City; Superintendent Eleventh Life-Saving District-Grand Haven, Mich.; and Superintendent Twelfth Life-Saving District, Appraisers' New Building, San Francisco, Cal. Envelopes containing proposals to be addressed to the "General Superintendent U. S. Life-Saving Service, Washington, D. C.," and marked on the outside, "Proposal for Annual Supplies." The right is reserved to reject any or all bids and to waive defects, if deemed for the interests of the Government. S. I. KIMBALL, General Superintendent. May 23

AMERICAN SHIP WINDLASS CO. P. O. BOX 53, PROVIDENCE, R. I.
BUILDERS OF THE
"Providence" Windlasses and Capstans
350 STYLES AND SIZES. OVER 5000 IN USE. *SEND FOR CATALOGUE.* FRANK S. MANTON, AGENT.

Don't You Believe It?
If you don't, give us a chance to prove that we can coal your boats with quick dispatch, and with most satisfactory fuel.
We have Four Large CHUTES on our Docks at AMHERSTBURG, ONTARIO, 1,000 FEET RIVER FRONT and Day and Night Force.
OUR STOCK CONSISTS OF
"Keystone" Massillon, Youghiogheny, and Best Grades of Hocking Koals.
O. W. SHIPMAN, MAIN OFFICE, 90 Griswold St., Detroit, Mich.

The Marine Manufacturing & Supply Co. 158 South St., NEW YORK.

Manufacturers and dealers in Ship Machinery, Windlasses, Capstans, Winches, Pumps, Brass Work, "Monitor" Side and Deck Lights, Cannon, Rails, Stanchions.

Ship Chandlery and Engineers Supplies, Cordage, Oakum, Wire Rope, Anchors, Chain, FLAGS AND SIGNALS, Hose, Packing, Oils, Waste, etc., etc.

Estimates furnished for complete outfits for vessels.

GRAHAM-MEYER TORCH and LIQUID LIGHT COMPANY

89 Fulton St., Boston, Mass. MANUFACTURERS OF

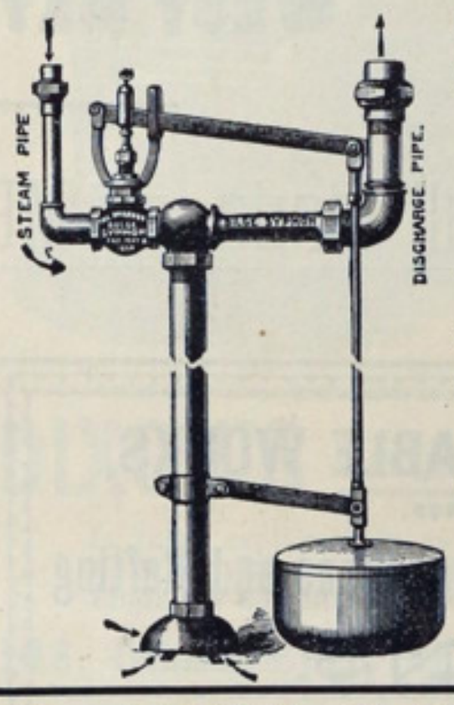
Torches and Liquids for Lights of Various Colors,

For Signal Lights and Illuminations of all kinds.
Blue Flash Lights a Specialy.

We call the attention of masters of vessels to the efficiency of our patented flare-up or flash light torch. It can be used with kerosene or spirits of turpentine. Its superiority over all other kinds of torches is that it is indestructible. Being filled with asbestos, it will last for years, and is ready for use at any moment. It gives a white flame three to five feet high, burns less liquid than any ordinary torch of the samc size or larger. The combustion is so perfect that very little smoke is made, and the flame is therefore much brighter. At night you can wigwag with this torch. Rain or spray will not extinguish it, and the stronger the wind the better it burns. We have also a **Blue, Green and Red Burning Liquid,** to make any code of signals required. Yachtsmen will find this of immense value for signaling.

Lake Agents: { The Upson-Walton Co., Cleveland, O. / H. Channon Co., Chicago, Ill.

THE BRAENDER AUTOMATIC BILGE SYPHON,



Always on Watch,

"SHIP AHOY."

It never tires, or goes to sleep, and is reliable at all times.

It is the best, cheapest and surest way of keeping your vessel dry.

They are indorsed by leading Engineers throughout the country.

They commend themselves wherever placed.

A dry bottom in ship's holds gains speed, which is equal to money.

By giving it a trial, it will speak for itself. Write for circular,

PHILIP BRAENDER,
261 West 118th Street, - NEW YORK.

THE BABCOCK & WILCOX CO.

FORGED STEEL WATER-TUBE MARINE BOILER,

29 CORTLANDT ST., NEW YORK.

BOILERS SOLD TO STEAMERS

NERO,	*ALGERIE,*	*ELEANOR,*	*REVERIE,*	*TROPHY,*
UNIQUE,	*HERO,*	*H. M. S. HUNTER,*	*SENECA,*	*PRESIDENT.*

Under construction :—Two steamships for Dominion Coal Co.; One steamship, Chicago Shipbuilding Co.

The Vanduzen Steam Jet Pumps

Are the Cheapest and Most Reliable Pumps in the world. Cannot get out of order, nor freeze up, nor clog.

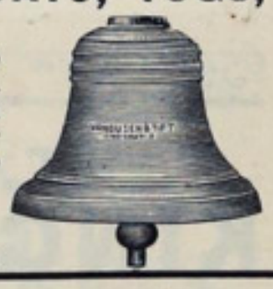
The Most Effective, Reliable and Durable.

Cost only from $7.00 up to $75.00. Capacity from 250 to 12,000 gallons per hour. For STEAMBOATS, BARGES and VESSELS of Every Description. Price, Catalogue, etc., Sent Free.

We are also founders of the Highest Grade, Finest Quality

BELLS FOR STEAMBOATS, TUGS,

Barges, Ferry Boats, Sailing Vessels, etc.



Our Bells are of approved workmanship, and of the BEST MATERIAL, and of full, clear tone, and will always pass Government inspection, as every Bell is reliable and first-class. We can supply them in Plain Finish or Highly Polished, and with or without Fancy Hangings. Price and Terms furnished free. Address,

The Buckeye Bell Foundry,
The E. W. Vanduzen Co., Prop's. CINCINNATI, OHIO.

FUEL COAL ....AT BUFFALO.

Vessels Supplied with best Youghiougheny Pittsburg or Fairmount Coal at Lehigh Valley Docks or by Barge, at market prices.

We are independent Coal Dealers and have no connection in Fueling business, directly or indirectly, with any Coal shippers by lake.

HOWARD & CO.,
Telephone 1381 15 White Building, BUFFALO, N.Y.

O. S. Richardson Fueling Co., ✱ ✱ O. S. Richardson & Co.

COAL **Office, 225 Dearborn St., CHICAGO, ILL.** COAL

Fueling Docks

Foot No. Market Street.
18th Street Bridge.
Illinois Central Slip "C."

Location of Fueling Docks indicated on the accompanying map by ✱

TELEPHONE MAIN 1845.

Anthracite Receiving Docks.

	Capacity tons.
Kingsbury, bet. Erie and Indiana	60,000
Elston & Division, North Branch	60,000
Halsted and Division Sts., Canal	60,000
North Ave. Bridge, North Branch	40,000
South Halsted St. Bridge, South Branch	60,000

F. W. WHEELER, President. E. T. CARRINGTON, Vice-President. C. W. STIVER, Secy. and Treas.

F. W. WHEELER & CO.,

West Bay City, Mich.

Builders of all kinds of METAL AND WOODEN SHIPS.

AMERICAN CHAIN CABLE WORKS.

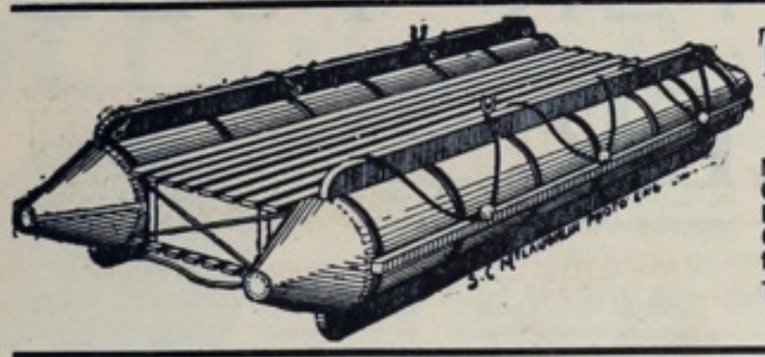
ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting

CHAINS.

Our DREDGE and CRANE CHAINS are made of IRON ROLLED SPECIALLY for that purpose. Send for Price List

J. B. CARR & CO., Manufacturers, TROY, NEW YORK.



Thos. Drein & Son,

BUILDERS OF

Metallic Life Boats and Rafts, Government and Pleasure Boats. Block and Granulated Cork Life Preservers. Outfit for Lake Steamers a Specialty.

TATNALL & RAILROAD STS.
Wilmington, Del.

For Sale

CHEAP for Cash or Chicago Improved Real Estate

Steamer CHIEF JUSTICE WAITE,

Located at 101st Street and Commercial Avenue.

SOUTH CHICAGO, ILL.

For particulars address, MARINE REVIEW, Cleveland, O.

IRA B. MANSFIELD. Tel. Main 3769. A. E. FINNEY.

MANSFIELD & FINNEY,

Send your Mail in Our Care. Yucatan Cigar Store. Proprietors Marine Laundry.
Telegraph and Messenger Calls in our Store. Vessel Service a Specialty.
173 Jackson Street, CHICAGO, ILL.

PARSONS & PATTISON TRADE A·B·C MARK CHICAGO, ILL.

ALKALI WATER PURIFIER!

A Pure Chemical for the SafeRemoval and Prevention of Scale in Steam Boilers In use by many of the larger steamship lines on the great lakes. Guaranteed.

MANUFACTURED BY

PARSONS & PATTISON CHEMICAL CO.,
1509 Masonic Temple, CHICAGO, ILL.

The L. Noier Et Cie and L.B. & C. PARIS STAR Brand Marine Glass.

The L. Noir et Cie and L. B & Co.

U. S. Marine and Signal Glasses have perfect combination and are of extra high power.

Vesselmen and Captains should see these Glasses before purchasing.

Our stock of Barometers, Compasses and Telescopes is complete.

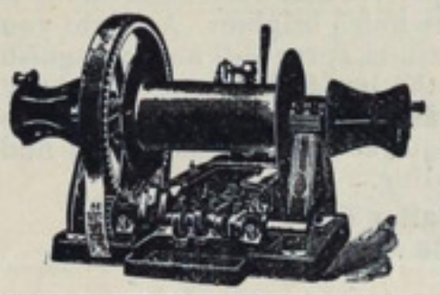
Repairing of all kinds of Nautical instruments a specialty.

L. BLACK & CO., Opticians, 145 Woodward Ave., DETROIT.

Jeffery's Marine Glue

For Paying Seams of Decks and other purposes.

L. W. FERDINAND & CO., Boston, Mass.
Send for Circular.



JACKSON & CHURCH,

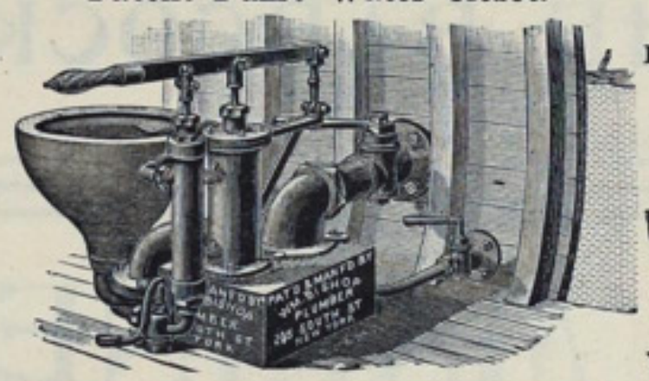
Builders of DUPLEX HOISTING and DECK ENGINES.

Plain Finished and Automatic ENGINES, From Heavy Patterns at Moderate Prices.

Vertical, Horizontal, Marine & Locomotive BOILERS Strictly First-Class and Highest Test.

Send for Circulars and Prices. SAGINAW, MICH.

Patent Pump Water Closet.



For Yachts, Pilot Boats, Naval Ships, Etc.

For above or below water line. In use on U.S.Cruisers New York, Columbia, and Battleships Indiana, Maine, Texas, Massachusetts, Etc. Our No. 4 can be put in a space 15 in. x 15 in.

WILLIAM BISHOP & SON,

205 South St., NEW YORK,
724 Third Ave., BROOKLYN.
Telephone 569 Franklin.
Yacht Fittings a Specialty.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER ON SHORT NOTICE.

654 Seneca Street, Cleveland, Ohio.

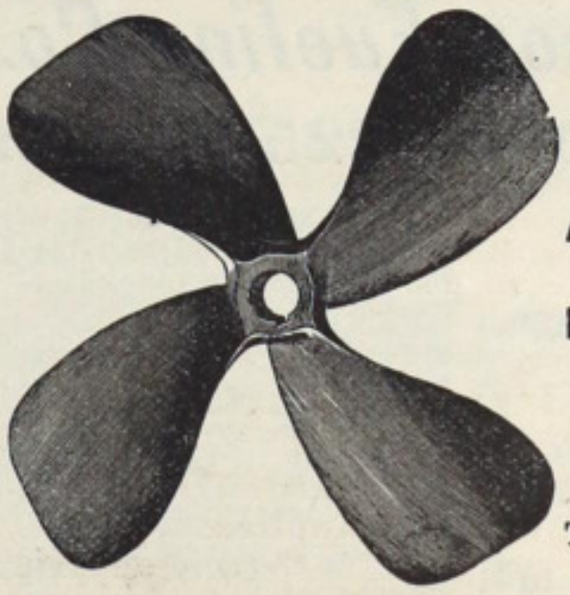
H. G. TROUT,

KING IRON WORKS,

BUFFALO, N. Y.,

MANUFACTURERS OF

TRIPLE EXPANSION, THREE CYLINDER, FORE AND AFT And STEEPLE COMPOUND MARINE ENGINES,



High and Low Pressure Engines, Sectional, Propeller, Tug and Yacht Wheels,

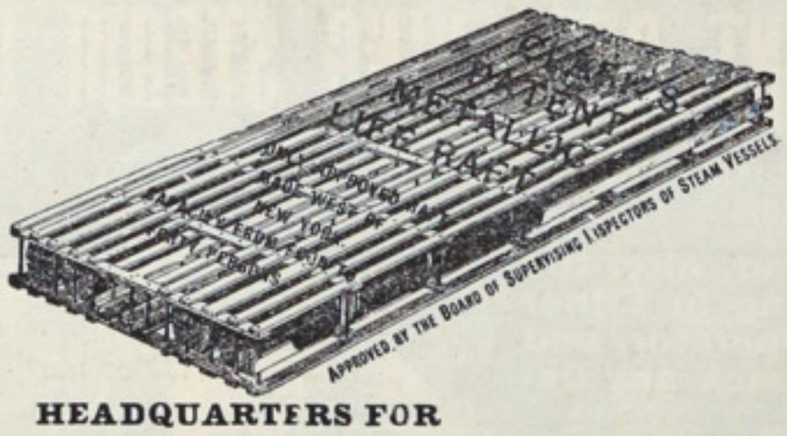
Cowles Aluminum and Manganese Bronze Propeller Wheels.

These Wheels are noted for their extra speed, towing power and proportionate saving of coal.

PRICES QUOTED ON APPLICATION.

The Upson-Walton Co.,

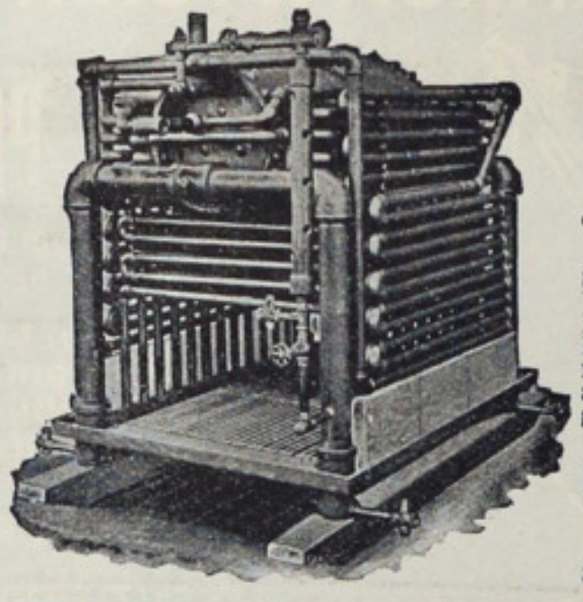
155 to 163 River St., CLEVELAND, O.



HEADQUARTERS FOR

BELLS and LIFE RAFTS.

The Roberts Safety Water Tube Marine Boiler,



For YACHTS, LAUNCHES and other Steamers.

THE ORIGINAL FIXED WATER LINE PIPE BOILER.

"Imitation the Sincerest Flattery."

We are collecting royalties from the customers of many infringers.

NEARLY 600 IN USE.

SAFE, RELIABLE, SIMPLE, LIGHT WEIGHT, ECONOMICAL, NO SHOP REPAIRS, SMALL SPACE. Send for ILLUSTRATED PAMPHLET and other reading matter, with hundreds of enthusiastic letters from purchasers and engineers.

— THE —

Roberts Safety Water Tube Boiler Co.

Works covering 12,000 sq. ft. of ground at RED BANK, N. J.

39 & 41 Cortlandt St., NEW YORK CITY.

DIXON'S Grapite Pipe Joint Grease

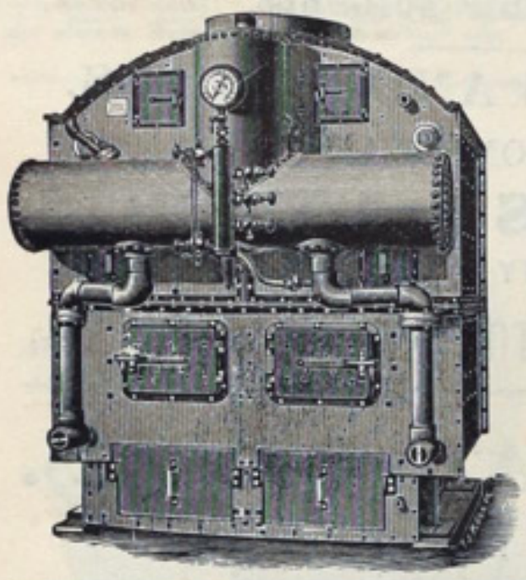
Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE PAMPHLET which is FREE to all interested. It will pay al Engineers and Machinists to SEND FOR IT.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.



ALMY'S PATENT

SECTIONAL

Water-Tube-Boilers.

NOW USED IN

18 Passenger Boats from 70 to 160 feet long.
27 Steam Yachts from 50 to 160 feet long.
U. S. Torpedo Boat "Stiletto."
Numerous Small Launches and Stationary Boilers are giving most excellent results.

ALMY WATER-TUBE BOILER CO.,
47 CLIFFORD ST.,
PROVIDENCE, R. I.

NEVERSINK CORK JACKET AND LIFE BELT.

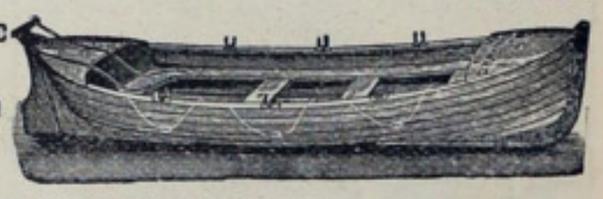
Warranted 24 lb. Buoyancy and full Weight of Cork, as required by U. S. Inspectors.
Consolidated Cork Life Preservers. Superior to all others. **Ring Buoys and Fenders.**

SAFEST. CHEAPEST. Approved and adopted by U. S. Board of Supervising Inspectors.

Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Vessels and the trade supplied. Send for catalogue.

Awarded four Medals by World's Columbian Exposition

Metallic and Wooden Life Boats.



Metallic Life Rafts, Marine Drags.

Manufacturer of Woolsey's Patent Life Buoy, which is the lightest, cheapest and most compact Life Raft known.

Send for Illustrated Catalogue.
Get our prices before buying elsewhere.

D. KAHNWEILER,
437 Pearl Street, NEW YORK CITY.

GEORGE B. CARPENTER. **ESTABLISHED 1840.** BENJAMIN CARPENTER

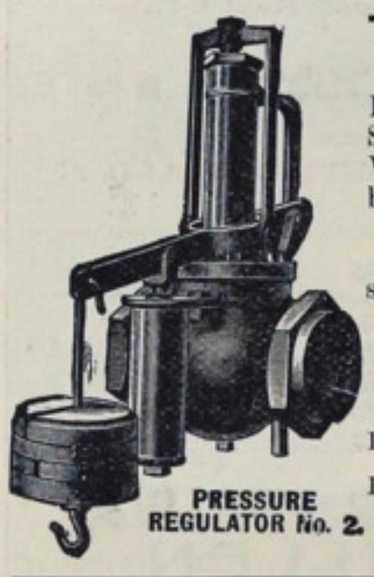
GEO. B. CARPENTER & CO.

Ship Chandlers and Sail Makers.

CORDAGE, TWINES, COTTON DUCK,
MILL, RAILROAD and VESSEL SUPPLIES.

202, 204, 206, 208 So. WATER STREET,
CHICAGO, ILL.

The "DAVIS" Pressure Regulator and Reducing Valve.



PRESSURE REGULATOR No. 2.

Is the simplest and best for reducing the pressure to Steam Steering Engines, Donkey Engines, Steam Winches and all places requiring a uniform pressure below that of boilers.

No diaphragms, spring or packing.

Cut shows scale weights. We can furnish lever and sliding ball weight if preferred.

MANUFACTURED BY

G. M. DAVIS & CO.
106 N. Clinton St., CHICAGO, ILL.

FOR SALE BY

R. E. Hills, Chicago
P. M. Church, Sault Ste. Marie.
C. H. McCutcheon, Buffalo.
Geo. Worthington Co., Cleveland.
Jas. Walker & Son, Detroit.
Jas. Clements & Son, Bay City, Mich
Cleveland Ship Building Co., Cleveland.
Chicago Ship Building Co., Chicago.

1880. 1893.

CHAS. H. POTTER & CO.,

Investment Bankers,

Cleveland, O.

Dealers in

Lake Superior Iron Mining Stocks,

on about 10 per cent. annual dividend basis, Republic Iron Co., Lake Superior Iron Co., Champion Iron Co., Minnesota Iron Co., Jackson Iron Co., Cleveland-Cliffs Iron Co., Chandler Iron Co., Chicago and Minnesota Ore Co.

Paint your Vessels with **Superior Graphite Paint.**

NO BLISTERING, CRACKING OR SCALING.

Made especially for Stacks, Decks, Sides, Hulls and Water Compartments. Strictly anti-rust, and most durable and economical.

DETROIT GRAPHITE MFG. CO., 541 River St., Detroit, Mich.

Whitton & Bates, Agents, 503 Perry-Payne Bldg., Cleveland O.

C. H. McCUTCHEON,

(Successor to SAMUEL McCUTCHEON.)

Copper, Tin and Sheet Iron Manufactory,

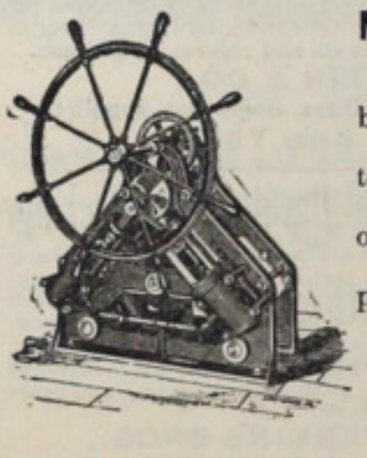
Steamboat and Engineers' Supplies.

All kinds of Brass Cocks, Globe Valves and Couplings, &c. Iron Pipe and Fittings, and Mill Supplies. Rubber Belting, Hose and Packings, Springs, Valves, &c., Leather Belting and Usudurian Packing.

Telephone No. 68. **No. 18 Ohio Street, BUFFALO, N. Y.**

SHERIFFS STEAM STEERER.

MADE IN TWO SIZES.

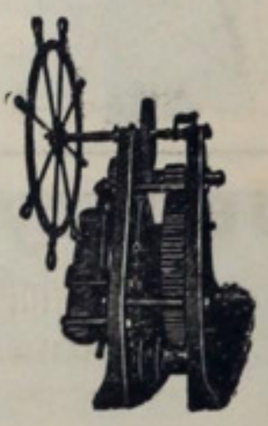


Are easy to adjust and can be handled by any one.

The Steerer can be arranged to set in pilot house or aft.

No Steerer will be sold without a quadrant.

Steerer will be sold on approval.



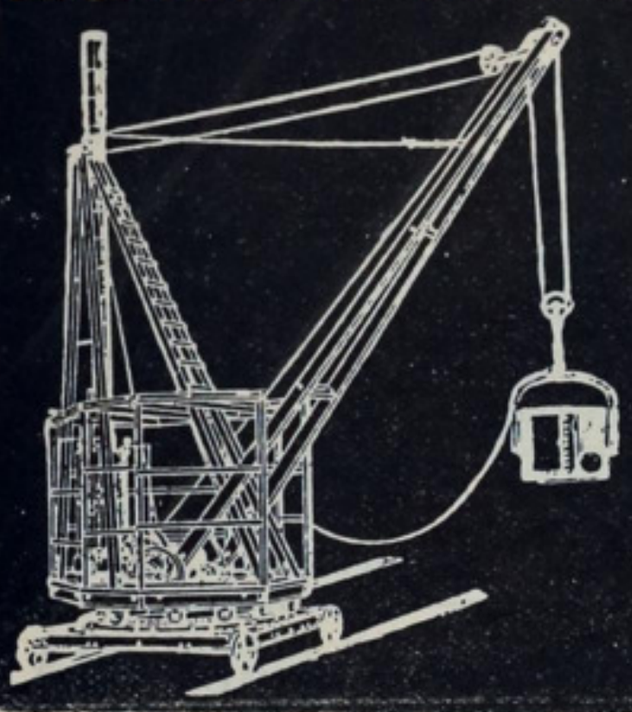
Manufactured by

SHERIFFS MFG. CO.,
126-130 Barclay Street,
MILWAUKEE, WIS.

McMYLER MANUFACTURING CO., 180 COLUMBUS STREET, CLEVELAND, O.

SOLE MAKERS OF THE

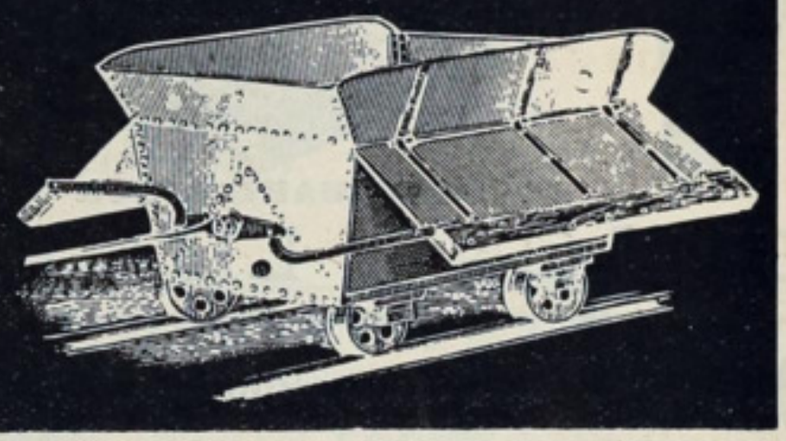
McMYLER PATENT REVOLVING STEAM DERRICK



FOR HANDLING COAL, ORE AND COARSE FREIGHT OF ANY DESCRIPTION.

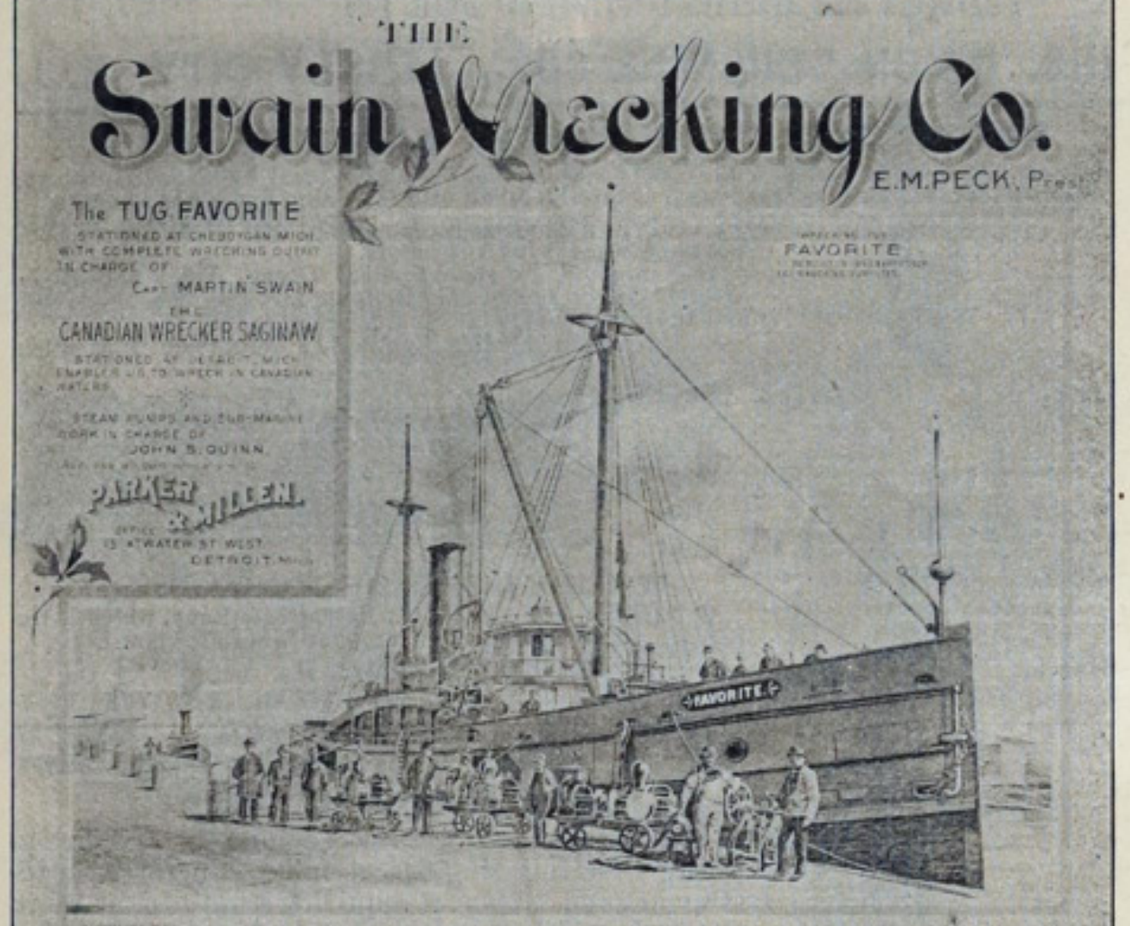
This Derrick can Lift Load, Alter the Radius of Boom, Swing in Either Direction at Will of Operator, and can Propel Itself on Track any Desired Distance.

BUILT FOR ANY CAPACITY WANTED



BUILDERS OF
CONVEYORS, COAL BUCKETS, ORE BUCKETS AND DUMP CARS.

THE
Swain Wrecking Co.
E. M. PECK, Pres.


The TUG FAVORITE
STATIONED AT CHEBOYGAN MICH. WITH COMPLETE WRECKING OUTFIT IN CHARGE OF
Capt. MARTIN SWAIN
THE
CANADIAN WRECKER SAGINAW
STATIONED AT DETROIT, MICH. EQUIPPED FOR WRECKING IN CANADIAN WATERS
STEAM PUMPS AND SUB-MARINE WORK IN CHARGE OF
JOHN S. QUINN
PARKER & MILLEN
OFFICE 13 ATWATER ST. WEST
DETROIT, MICH.
FAVORITE
FAVORITE
4 STEAM PUMPS, 10 JACKS, 8 HAWSERS.
1 COAL and ORE PUMP
3-12 INCH ROTARY
1-14 INCH WORTHINGTON
DIVING RIGS AND DIVERS ABOARD AT ALL TIMES
1895 May 1895
Sunday Monday Tuesday Wednesday Thursday Friday Saturday
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31
10-100 TON JACKS
1-12 INCH HAWSER
1-10
1-9
Telegraph
CAPT. M. SWAIN,
CHEBOYGAN MICH.

TELEGRAPH
PARKER & MILLEN.
DETROIT. MICH.

KATZENSTEIN'S Self-Acting METAL PACKING,

For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl-Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

The Original Unvulcanized Packing.

Jenkin's Standard Packing has been severely tested in all positions and under all actions of steam, superheated steam, oils, acids, etc., and has never failed to make a perfect joint when properly applied. See that it is stamped "Jenkin's Standard Packing" and bears Trade Mark.

JENKINS BROS.,
New York, Boston, Philadelphia, Chicago.

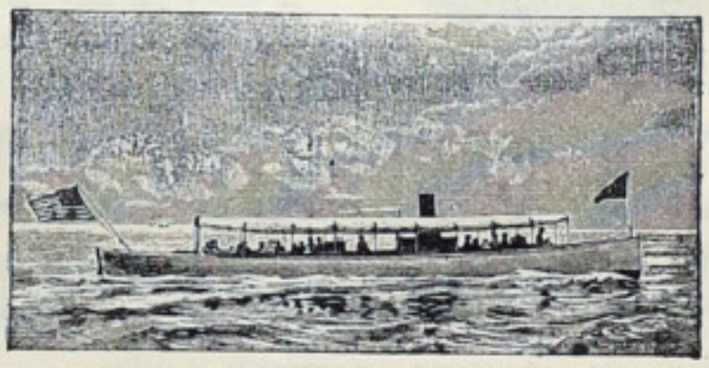
The Bertram Engine Works Co.
(LIMITED.)
ENGINEERS AND SHIP BUILDERS.

MARINE ENGINES AND BOILERS.
STEEL AND COMPOSITE
STEAMERS, TUGS and YACHTS.
ROBERTS AND MOSHER SAFETY WATER-TUBE BOILERS.

Office and Works: Niagara & Bathurst Sts., TORONTO, ONT., Ship Yard: Foot of Bathurst St.

DETROIT BOAT WORKS.

STEEL and WOODEN



YACHTS and LAUNCHES.

BUILDERS OF *ELECTRIC LAUNCHES,* **DETROIT, MICH.**
Any Class Wooden, Iron or Steel Boats up to 150 ft. in length.
YAWLS. METALLIC LIFE BOATS. LIFE RAFTS.
All kinds of Small Pleasure Boats.
The electric launches used on the lagoons at World's Fair were manufactured by this company.
Send for new illustrated Catalogue of electric launches.

SHIP LAMPS.

OIL AND ELECTRIC FIXTURERS
FOR
Steamships, Yachts, &c.
GREAT VARIETY OF DESIGNS.
Prices and Cuts on Application.

PAGE BROS. & CO.,
(FORMERLY WILLIAMS, PAGE & CO.)
227 to 233 Cambridge St., BOSTON, MASS.

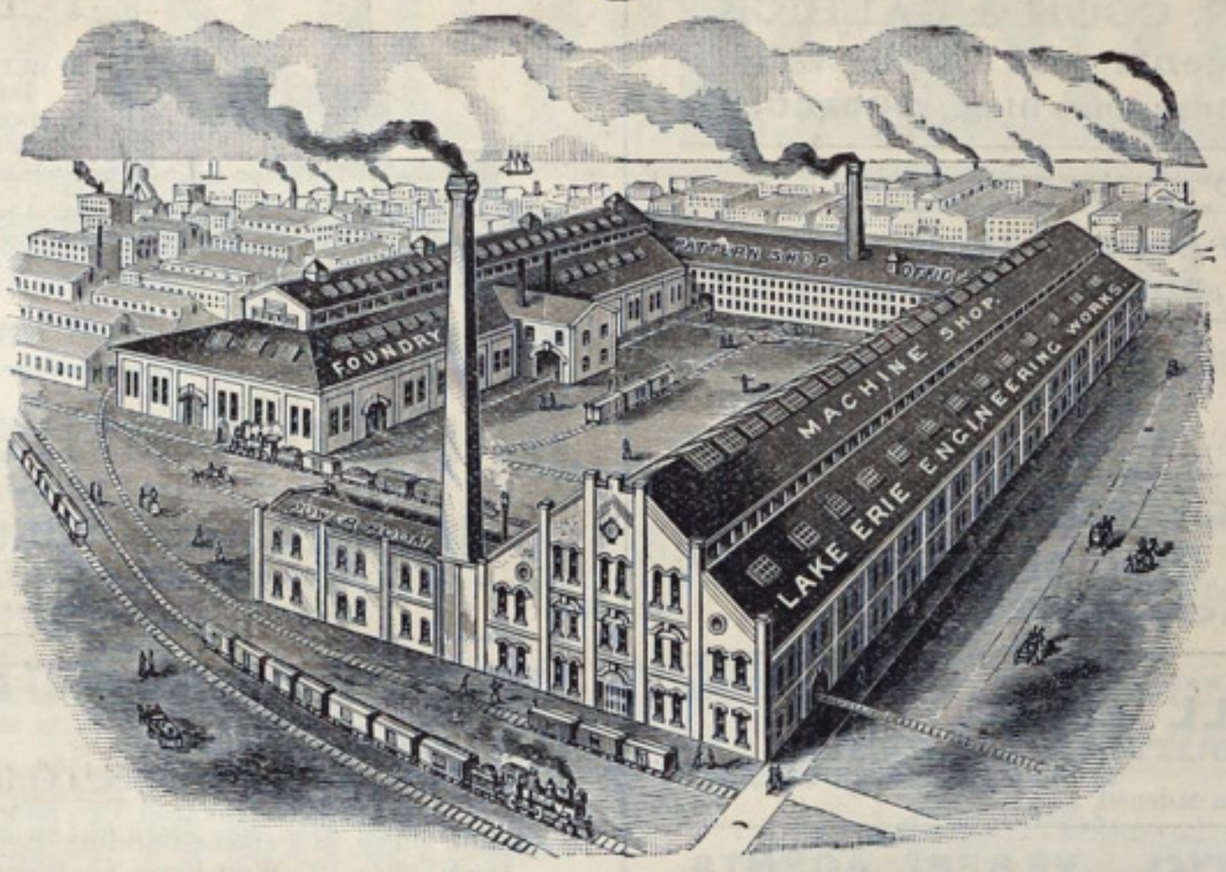
P. M. CHURCH & CO.,
SAVINGS BANK BLOCK, SAULT STE. MARIE, MICH
LEADING DEALERS IN
Ship Chandlery,
Marine Hardware, Paints, Oils, Packings, Cordage, Etc.
FIRST-CLASS COPPERSMITH AND TINSHOP IN CONNECTION.

Lake Erie Engineering Works, Buffalo, N. Y.

RICHARD HAMMOND, Pres't.

JOHN COON, Sec'y and Treas.

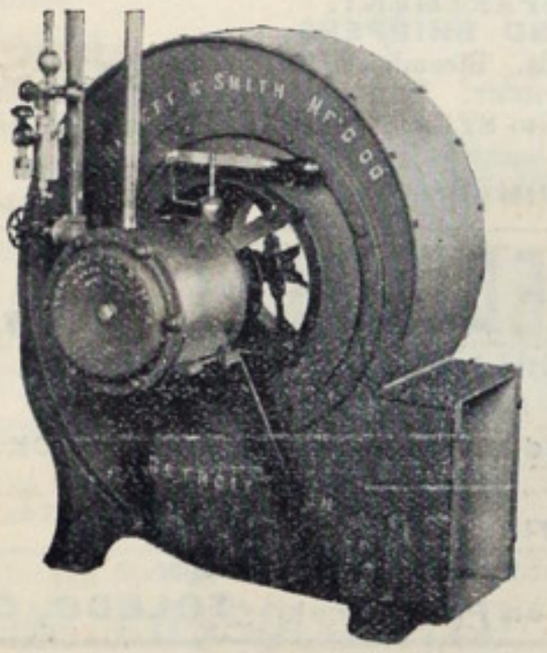
Steam Engines, Compound, Triple and Quadruple Expansion Engines, From 250 to 10,000 Horse Power For Marine and Stationary Service.



Special Designs for Cable Railways and Electric Power Plants.

The Best Economy and Regulation Guaranteed.

THE BEST EQUIPPED PLANT IN AMERICA.



The Smith Blower and Engine.

SHIP AHOY!

AHA, AHA, SIR! WHAT IS IT?

THE BEST

MARINE WATER TUBE BOILERS,

For Steam Yachts, Etc. and

COMBINED BLOWER and ENGINE,

For Forced Draught and Ventilation

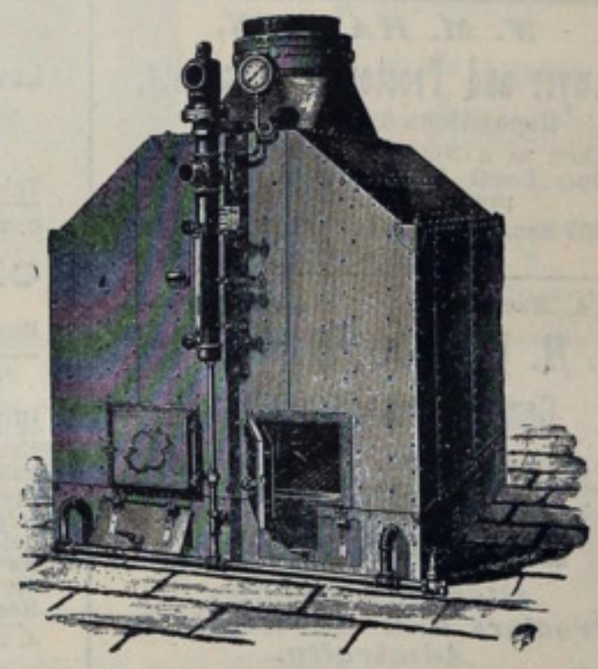
ARE MANUFACTURED BY

The Huyett & Smith Manufacturing Company,

Detroit, Mich.

Makers of the largest line of Fans and Blowers in the United States.

(Write for Catalogue, References, Etc.)

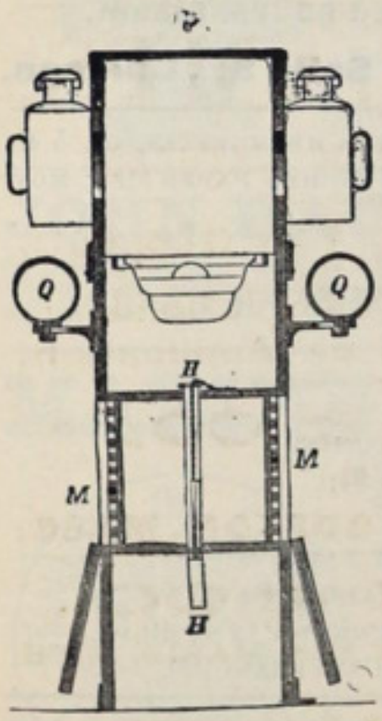


The Smith Marine Water Tube Boiler

PATENT ADJUSTABLE

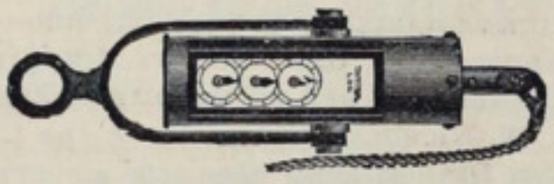
BINNACLE and COMPASS

FOR PILOT HOUSES.



With Directions for Adjustment.
SEND FOR CIRCULAR.

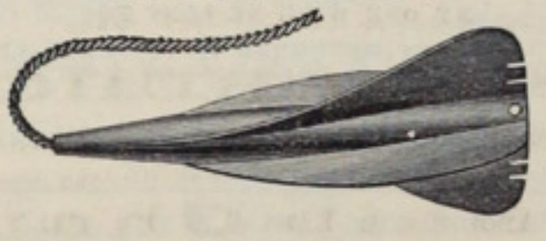
..TAFFRAIL LOG..



WITH ADJUSTABLE ROTATOR.

BEST LOG IN THE MARKET.

THOUSANDS IN USE.



MANUFACTURED BY

JOHN BLISS & CO., 128 Front Street, NEW YORK.

The Chase Machine Co.

111 ELM ST., CLEVELAND, O.

...MACHINISTS AND ENGINEERS...

MANUFACTURERS OF

LAND AND MARINE ENGINES and STEAM PUMPS,

SOLE OWNERS AND MANUFACTURERS OF

Chase Fog Whistle Machine.

Over 150 in use on the best class of Lake Steamers.

Special Attention given to Marine Repair Work.

ENGINEERS' SUPPLIES.

ASBESTOS PIPE AND BOIER COVERING. TELEPHONE 994.

An Opportunity for ENGINEERS!

Two Indicators for Sale Cheap.

THOMPSON LATEST IMPROVED, with six extra springs —warranted good as new—used only a few times— It is worth $115—our price $70.

Calkins Steam Engine Indicator, Planimeter, Pantograph extra springs, and three way cock—full outfit for taking indicator cards — regular price $40 — our price $35.

MARINE REVIEW,
516 Perry-Payne Bldg., Cleveland, O.

HARVEY D. GOULDER,
LAWYER AND PROCTOR IN ADMIRALTY,
CLEVELAND, O.

C. F. PALMER.
CAPT. J. A. CALBICK.
W. H. COOK.
PALMER, COOK & CALBICK,
Vessel Agents and Underwriters.
Tel. Harrison 689. 108 & 109 Royal Insurance Bldg., CHICAGO, ILL.

H. R. SPENCER,
ATTORNEY AT LAW and PROCTOR IN ADMIRALTY.
218 Superior St., DULUTH, MINN.

C. E. KREMER, *Attorney and Counselor-at-Law and Proctorin Admiralty.*
Rooms 14, 15 and 16, Bryan Block, - - 164 LA SALLE ST., CHICAGO, ILL.

HARVEY L. BROWN,
Attorney at Law and Proctor in Admiralty,
Buffalo, N. Y.

JOHN MITCHELL. JOHN F. WEDOW. ALFRED MITCHELL.
MITCHELL & CO.,
Vessel and Insurance Agents,
508, 509 and 510 Perry-Payne Building, CLEVELAND, OHIO
Office Telephone, 737. Reidence, John Mitchell, 3506.

C. R. JONES & CO., VESSEL AGENTS,
FIRE AND MARINE INSURANCE.
Nos. 501, 502 and 503 Perry-Payne Bldg., CLEVELAND, O.

W. M. HAYDEN,
Lawyer and Proctor in Admiralty,
Depositions and Testimony
Taken as a Notary or under a commission. Legal business and collections promptly attended to.
1007 Soc. for Sav. Bldg., CLEVELAND, O.
Telephone 2297.

C. A. Macdonald. J. J. Rardon.
C. A. MACDONALD & CO.
General Insurance Agents,
RIALTO BUILDING, CHICAGO, ILL

H. S. LORD. J. H. NORTON.
LORD & NORTON,
Attorneys-at-Law,
Proctors and Advocates in Admiralty,
DULUTH, MINN.

White, Johnson & McCaslin,
ATTORNEYS-AT-LAW,
—AND—
Proctors in Admiralty,
26-27 Blackstone Building,
CLEVELAND, - OHIO.

THOS. WILSON,
MANAGING OWNER
WILSON'S TRANSIT LINE.
Gen. Forwarder.
Freight and Vessel Agent.
CLEVELAND, O.

C. F. Palmer. C. L. Hutchinson.
PALMER & CO.,
Vessel Agents and Underwriters,
515 Perry-Payne Bldg., Cleveland, Ohio.
Telephone 644.

W. A. HAWGOOD. C. C. CANFIELD.
HAWGOOD & CANFIELD,
Vessel Agents and Marine Insurance,
604-605 Perry-Payne Bldg.,
Cleveland, - Ohio.
Telephone No. 2395.

ORESTES C. PINNEY,
Lawyer and Proctor in Admiralty.
Rooms 722 and 723 Perry-Payne Bldg.
CLEVELAND, OHIO.
Telephone 2585.

C. W. ELPHICKE. JAS. A. MYERS.
A. L. FITCH.
C. W. ELPHICKE & CO.
GENERAL INSURANCE AGENTS.
Room 10, No. 6 Sherman St., Chicago, Ill.

H. J. WEBB & CO.
SHIP BROKERS, VESSEL OWNERS and AGENTS,
Established in 1856. H. J. Webb & Co. will charter vessels for the lake trade. Special attention given to chartering vessels in the Lake Superior Iron Ore trade, both for the season and single trip.
☞No. 606 & 607 Perry-Payne Building, Cleveland, O. Office Telephone No. 338, Residence No 3228.

J. T. ROSE. FRANK B. LAZIER.
ROSE & LAZIER,
Vessel Agents and Brokers, and Marine Insurance,
16 Board of Trade,
DULUTH, - - MINN.

Capt. LYMAN HUNT. JAMES P. HUNT.
L. HUNT & SON,
Vessel Brokerage & Marine Insurance,
Room 9, Exchange Building.
Telephone No. 522.
No. 202 Main St., BUFFALO, N.Y.

Send 10c for a handsome 64 page illus. Catalogue of Boats, Yachts, Canoes, Launches, etc., to G. D. FELLOWS, Racine, Wis.

PATENTS
Promptly secured. Trade-Marks, Copyrights and Labels registered. Twenty-five years experience. We report whether patent can be secured or not, free of charge. Our fee not due until patent is allowed. 32 page Book Free.
H. B. WILLSON & CO., Attorneys at Law, Opp. U. S. Pat. Office. WASHINGTON, D.C.

H. A. BARR, PRESIDENT, Escanaba. F. H. VAN CLEVE, SEC. Escanaba. CAPT. GEO. BARTLEY, SUPT. Escanaba.
ESCANABA TOWING & WRECKING CO., Escanaba, Mich.
Tugs, Lighters, Steam Pumps, Hawsers, Hydraulic Jacks and Diving Appliances always ready.
TUG MONARCH, Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch-Stroke, Steam Pressure Allowed, 125 pounds.
TUG DELTA, Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.
TUG OWEN, Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.
CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction

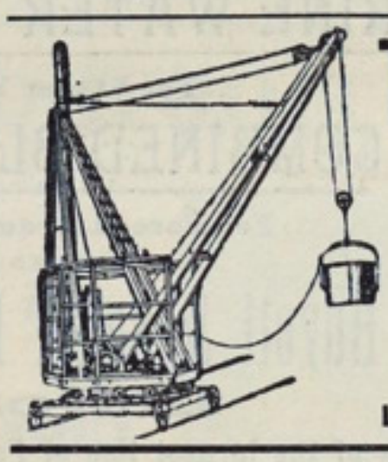
Pickands, Mather & Co.,

FUEL LIGHTERS AT BUFFALO, ERIE, ASHTABULA AND CLEVELAND.
At DETOUR, MICH., A FUEL DOCK equipped with Shute capacity of 600 Tons.
Best Quality PITTSBURGH COAL furnished at any time during Day or Night.
Western Reserve Building, CLEVELAND, O.

Mullen-Gatfield Coal Co.
— DEALERS IN THE CELEBRATED —
MANSFIELD AND YOUGHIOGHENY COALS.
Docks at SANDWICH, ONTARIO, opposite the Fort at Detroit, with chutes for rapid fueling.
Elevated docks and derrick at AMHERSTBURG, ONTARIO.

THE CUDDY-MULLEN COAL CO.
Dealers in COAL. Docks at Government Pier, Whiskey Island, and Adjoining Globe Dry Dock.
All fully equipped with Revolving Derricks; also, Lighter Carrying Derrick and One Hundred Two and One-Half Ton Buckets.
Main Office, 81 Perkins Building, East Side of Main Street Bridge.
Dock Office, 127 West River St., Cleveland, O. Telephone No. 8.
Boats Coaled Day and Night. Docks at Amherstburg,

Ohio & Pennsylvania Coal Co.
FUEL DEPARTMENT.
MINERS AND SHIPPERS,
Youghiogheny and Ohio Steam Coals. Steamboats, Tugs, etc., Coaled day or night, DOCKS FOOT WEST RIVER STREET. WHISKEY ISLAND GOVERNMENT PIER and C. & P. R. R. SLIPS. Also STEAM LIGHTER—Equipped with Revolving Derrick and (100) two ton buckets.
Telephone 1608. Office, 130 West River St., CLEVELAND, OHIO.



TOLEDO FUEL CO.,
Cambridge, Hocking, Jackson and Massilon Coal
Wheeled on or put on with DERRICK.
NIGHT OR DAY.
SATISFACTION GUARANTEED.
H. H. WILLIAMS, Manager.
Located on Penn. Dock, TOLEDO, O.

Marine Engineering
(*Also Stationary and Locomotive*); *Mechanics; Mechanical Drawing; Electricity; Architecture; Iron Work; Railroad, Bridge and* Municipal Engineering; Plumbing; Heating; Mining; Prospecting; English Branches. CANDIDATES PREPARED TO OBTAIN LICENSES. Courses begin with Arithmetic. Send for Free Circular, stating subject you wish to study.
The International Correspondence Schools, Scranton, Pa.

TAUGHT BY MAIL THOROUGH PRACTICAL

For Sale TUG in First-Class Shape.
Engine 18x22, Good Boiler, Allowed 95 lbs. Steam.
Cond t & Hussey, Room 59, 159 La Salle St, Chicago.

MARINE ART VIEWS: SIX HANDSOME PHOTO-CHROMOTYPES, OF 5 BY 8 AND 6 BY 9 INCHES PICTURE SIZE, AND 9 BY 12 INCHES PAPER SIZE; MOST ATTRACTIVE MARINE PICTURES PUBLISHED—

NIGHT SCENE, U. S. CRUISER MINNEAPOLIS,
LARGEST STEAMER ON THE LAKES, ZENITH CITY,
I. W. NICHOLAS, DUPLICATE OF THE CHILI,
TEN DETROIT-BUILT STEAMERS. GROUPED,
THE NORTH LAND—EVENING SCENE,
THE W. H. GRATWICK—HEAVY WEATHER COMING.

THE SIX WILL BE SENT IN A TUBE FOR $1;
ANY ONE WILL BE SENT FOR 25 CENTS;
MONEY RETURNED IF PICTURES ARE NOT SATISFACTORY.

MARINE REVIEW,
516 PERRY-PAYNE BLDG.,
CLEVELAND, O.

"AROUND THE LAKES" IS THE TITLE OF A BOOK CONTAINING A LIST OF ALL LAKE VESSELS WITH POST OFFICE ADDRESS OF MANAGING OWNERS. ILLUSTRATIONS ALL HIGH-CLASS PHOTO-ENGRAVINGS. SOLD BY THE MARINE REVIEW AT $2.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.

320 ATWATER STREET,
DETROIT, MICH.

BAR IRON — THE CONDIT FULLER CO. — PIG IRON

CLEVELAND, O.

BOILER RIVETS, BOILER TUBES, IRON PIPE,
BOAT SPIKES,
CLINCH RINGS, &c.

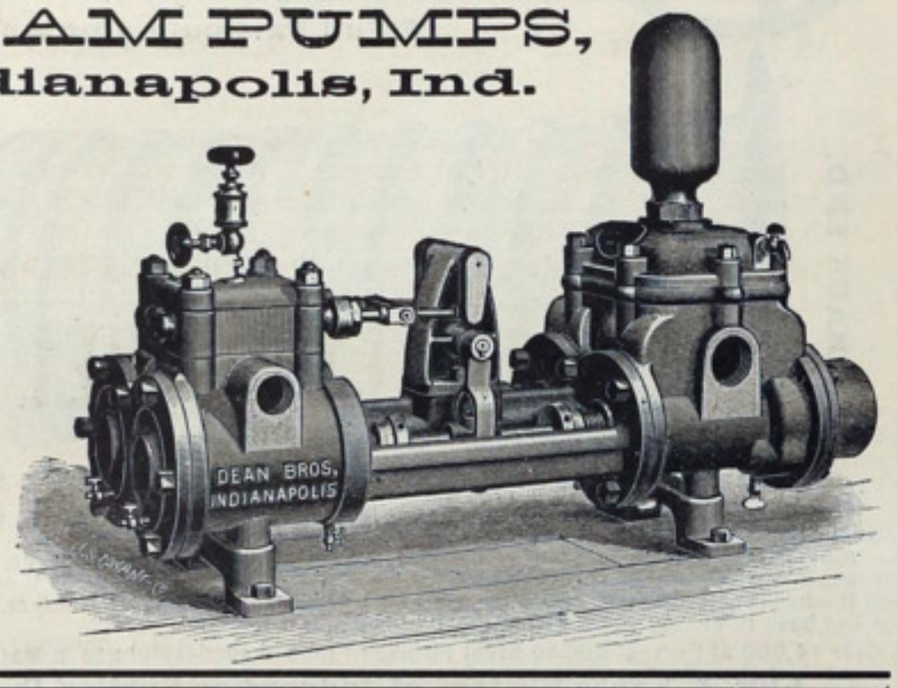
HIGH GRADE MATERIALS FOR VESSEL CONSTRUCTION A SPECIALTY.

SALES AGENTS:
THE CARBON STEEL CO.
MANUFACTURERS OF
ACID OPEN HEARTH STEEL
SHIP, BOILER, BRIDGE AND TANK PLATES, &c., &c.

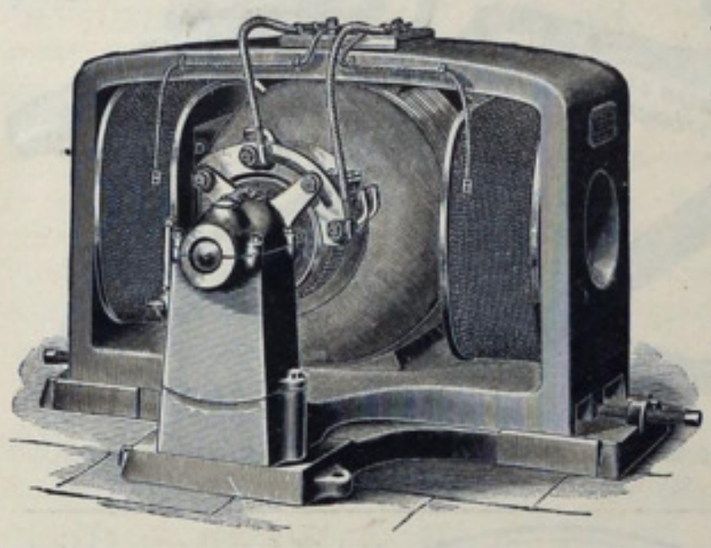
SALES AGENTS:
THE CAMBRIA IRON CO.
MANUFACTURERS OF
ACID OPEN HEARTH AND BESSEMER STEEL
ANGLES, BARS, CHANNELS, BEAMS, TEES, ZS, &c.

DEAN BROTHERS,
STEAM PUMPS,
Indianapolis, Ind.

Boiler Feeders, Air Pumps and Condensers, Ballast Pumps, Fire Pumps, Bilge Pumps.



SEND FOR CATALOGUE



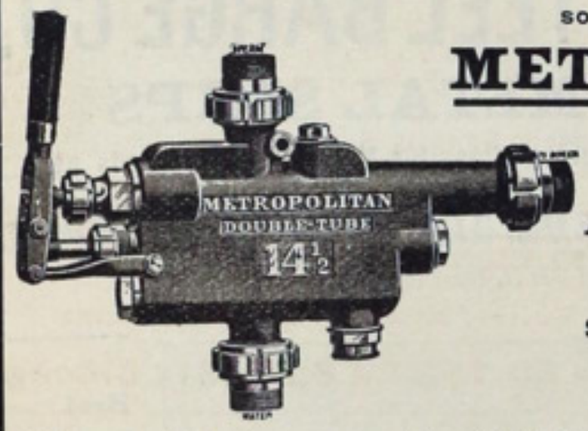
Electrical Supplies
—FOR—
..STEAMSHIPS..
A SPECIALTY.

The F. P. Little Electrical Construction and Supply Co.
No. 135 E. Seneca Street, BUFFALO, N. Y.
Send for Catalogue

N. G. HAYDEN, Pres. J. N. DERBY, V. Pres. M. LUSCOMB, Secy. & Treas.

THE HAYDEN & DERBY M'F'G CO.

SOLE MANUFACTURERS
METROPOLITAN INJECTORS
AUTOMATIC and DOUBLE TUBE.



Send for our new book—SENT FREE—
"Practical Information on Injectors."

Office and Salesroom, No. 113 LIBERTY ST., NEW YORK.

—THE—
Bethlehem Iron Company

PRINCIPAL OFFICE and WORKS:
SOUTH BETHLEHEM, PENNA.

Steel Rails, Open Hearth, Bessemer and Nickel Steel Billets and Forgings.

Hydraulic Forged Shafting, Hollow or Solid.
Cranks, Rolls, Etc.

Rough Machined or Finished. Fluid Compressed Steel.

GUNS and ARMOR.

New York Office, 80 Broadway.
Philadelphia Office, 421 Chestnut St.
Western Agents, FISHER & PORTER,
1025 Monadnock Building, - Chicago, Ills.

JOHN HAUG,
Consulting Engineer and Naval Architect.

Ship and Engineer Surveyor Lloyds Register, London.
Plans, Specifications and Superintendence of Ships and their Machinery.
Specialties—Bulk Oil Vessels High Speed Yacht Engines, etc.

206 Walnut Place, Philadelphia.

MARINE VALVE OIL — FOR INTERNAL LUBRICATION. — RENOWN ENGINE OIL — FOR EXTERNAL LUBRICATION.

Marine Valve, Renown Engine, Eldorado Engine, Crank Case, Victor Signal, Dark Lubricating, Mineral Seal, Head Light, Artic Cup Greases, and Lard Oils.

— CARRIED IN STOCK AT THE —

STANDARD OIL COMPANY'S MARINE DEPOT,

TELEPHONE 77. 123 River Street, CLEVELAND, O. MAIN OFFICE TELEPHONE 682.

ALSO FOR SALE BY STANDARD OIL COMPANY,
Chicago, Ill., No. 5 Wabash Ave.
Racine, Wis.
Milwaukee, Wis., Broadway & Mason.
Sheboygan, Wis.
Manitowoc, Wis.
Green Bay, Wis.
Marinette, Wis.
Oshkosh, Wis,
Duluth, Minn,
West Superior, Wis.
Hancock, Mich.
Marquette, Mich.
Buffalo, N. Y.
Sault Ste. Marie, Mich.
West Bay City, Mich., M.C.Ry. & 10th St
Saginaw, Mich., Eighth & Sears Sts.
Detroit, Mich., 46 Jefferson.
Toledo, O., Summit & Monroe Sts.

ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HULL & RAND, Huron, O.
EDWARD BRAMMALL, B nton Harbor, Mich.
BABY & DALE, St. Clair, Mich.
N. C. ALTEN, Lorain, O.
A. F. HARRINGTON, Conneaut Harbor, O.
A. H. MCGONAGIL, South Chicago, Ill.
MARINE SUPPLY CO., Fairport, O.
F. KRANZ, Sandusky, O.
THE M. I. WILCOX CORDAGE & SUPPLY CO., Toledo, O

COMPLETE ✱ ELECTRICAL ✱ INSTALLATIONS

For Steamships, Whalebacks, Yachts, Docks, Wharves, Etc.

DYNAMOS, WIRING APPLIANCES, WIRES, LAMPS, SEARCHLIGHTS, HOISTS, ETC, All of the Latest and Most Perfect Type.

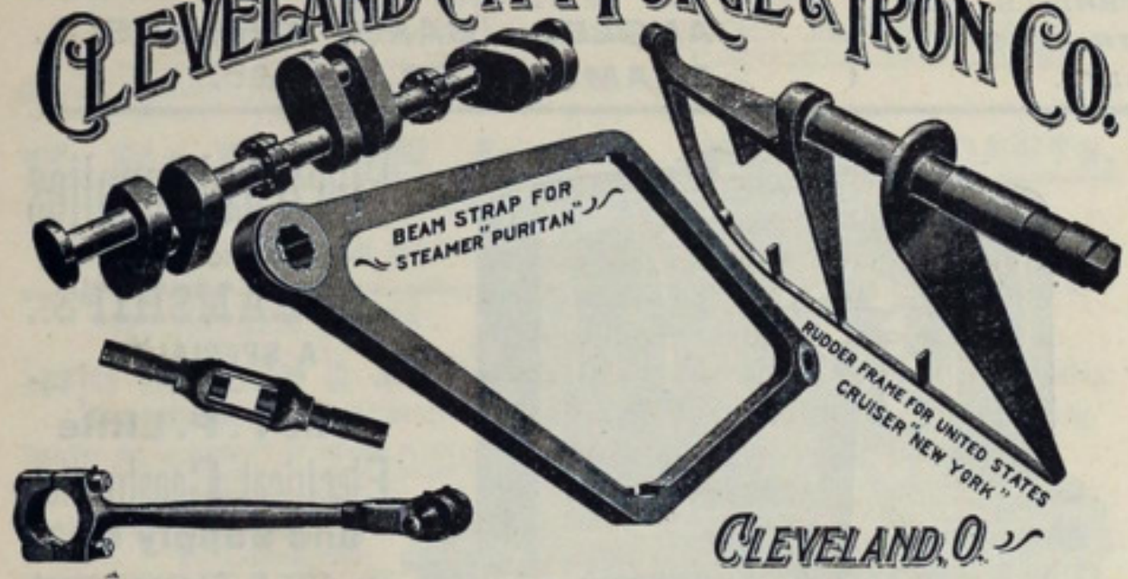
GENERAL ELECTRIC COMPANY.

SALES OFFICES: { Schenectady, N. Y. Boston, Mass. | Chicago, Ill. Philadelphia, Pa. | Detroit, Mich. Baltimore, Md. | Buffalo, N. Y. Portland, Ore. | Columbus, O. San Francisco, Cal. | New York, N. Y

FRONTIER IRON WORKS

MARINE ENGINES, DETROIT, MICH

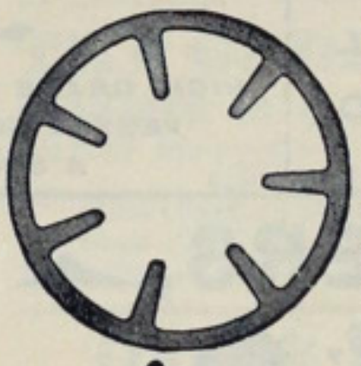
CLEVELAND CITY FORGE & IRON CO.



CLEVELAND, O.

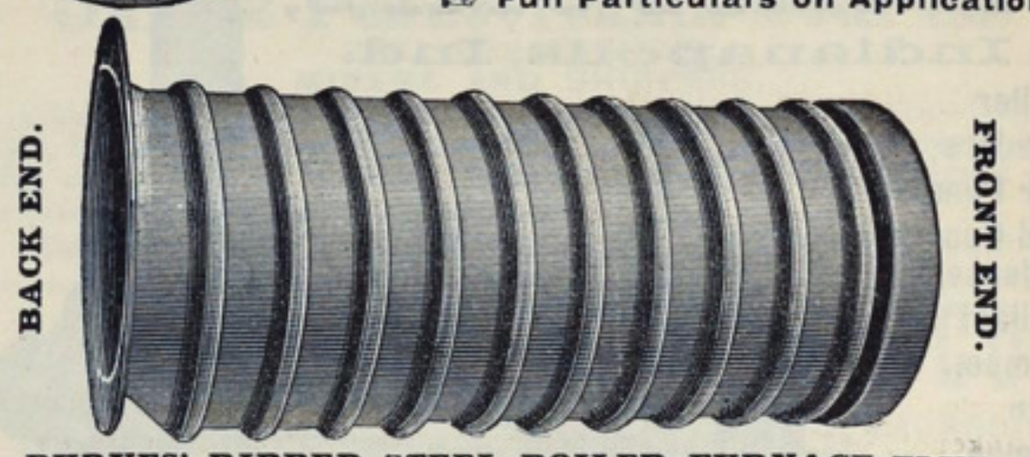
IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT. COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

Serve's Steel Ribbed Boiler and Stay Tubes



Show an average economy in fuel of 15 per cent. In steamers this means not only so much saving in cost of coal or increased power, but additional freight capacity.

☞Full Particulars on Application.



PURVES' RIBBED STEEL BOILER FURNACE FLUE.

With this style of Furnace Flue the rivets at the "back ends" are out of the line of fire, and all that has to be done to remove it is to cut out the rivets at the ends and slip it through the front; and to replace it, simply to slip it back in its place and rivet up the ends again without disturbing any part of the boiler. No smithwork is required to fit it on a boiler or to refit it when replaced. It is ready for use as it comes from the manufacturers. This style of flue has been in use six years without a single complaint.

Over 14,000 of Purves' Ribbed Steel Furnace Flues in successful use in Marine Boilers.

Ellis & Eaves System of Induced or Suction Draft.

CHARLES W. WHITNEY, Sole Agent for the United States and Canada, 64, 66, 68 BROADWAY NEW YORK

COAL

STANLEY B SMITH & CO.

OPERATING SMITH'S COAL DOCK, POCKET FUELING AND LOW DOCK, DETROIT, MICH.

OFFICES: DETROIT MICH.

OPERATING LORAIN COAL DOCK, LORAIN, OHIO. LAKE SHIPPERS OF STEAM COAL.

STEAMBOAT FUELING

COAL

AMERICAN STEEL BARGE CO.

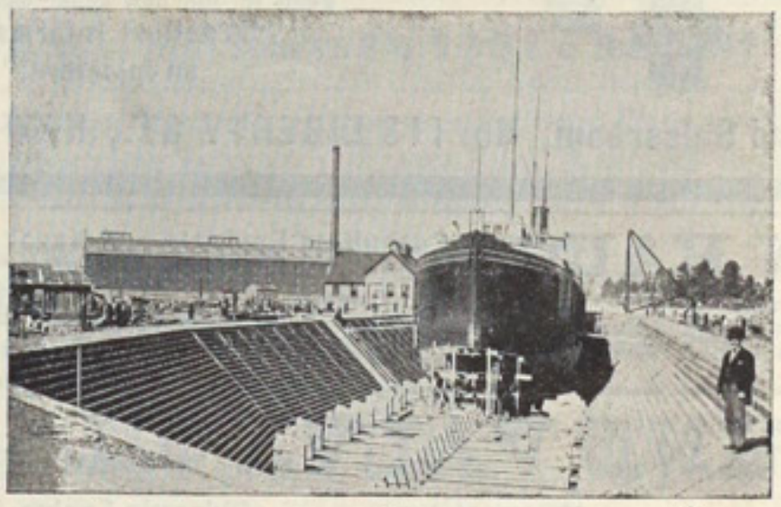
STEEL and METAL SHIPS

Of all classss built on the Shortest Possible Notice at our yards at

West Superior, Wis., and also at Everett, Wash.

Photograph of 300 ft. Boat in Dock.

Plates & Material Always on hand to Repair all kinds of Metal Ships in Shortest Time.



Best Quality of Oak instock for Repairing Wooden Vessels of all Classes.

SIZE OF DOCK.

Length, extreme	537 feet.	Entrance, Top	55 feet 9 in.
Breadth, Top	90 " 4 in.	Entrance, Bottom	50 "
Breadth, Bottom	52 "	Depth over Sills	18 "

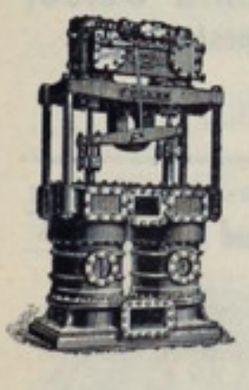
LARGEST DRY DOCK ON THE LAKES.

Prices for Repairs and Docking same as at lower lake ports

SUPERIOR, WIS.

THE GEO. F. BLAKE MFG. CO.

BUILDERS OF



MARINE PUMPS

Single and Duplex Pumps for Boiler Feed, Fire or Bilge Service—Vertical and Horizontal.

Vertical and Horizontal Pumps, Air Pumps for Surface and Jet Condensers.

AIR PUMP ON U.S. CRUISER NEW YORK.

95 and 97 Liberty St., NEW YORK.

AN ARTISTIC PHOTO OF THE NORTH WEST, HANDSOMELY MOUNTED, SENT TO ANY ADDRESS FOR 50 CENTS, BY THE MARINE REVIEW. MONEY RETURNED IF YOU ARE NOT SATISFIED.

THE MOST ARTISTIC MARINE PHOTO EVER MADE, THE NORTH WEST, PICTURE 4 BY 5½ INCHES, MOUNTED ON HEAVY 8 BY 10 CARD—SEND 50 CENTS TO THE MARINE REVIEW FOR A COPY.

"ROPER'S LAND AND MARINE ENGINES," BOUND IN MOROCCO WITH FLAP AND POCKET, WILL BE MAILED TO ANY ADDRESS FOR $3.50 SENT TO THE MARINE REVIEW, CLEVELAND, O.